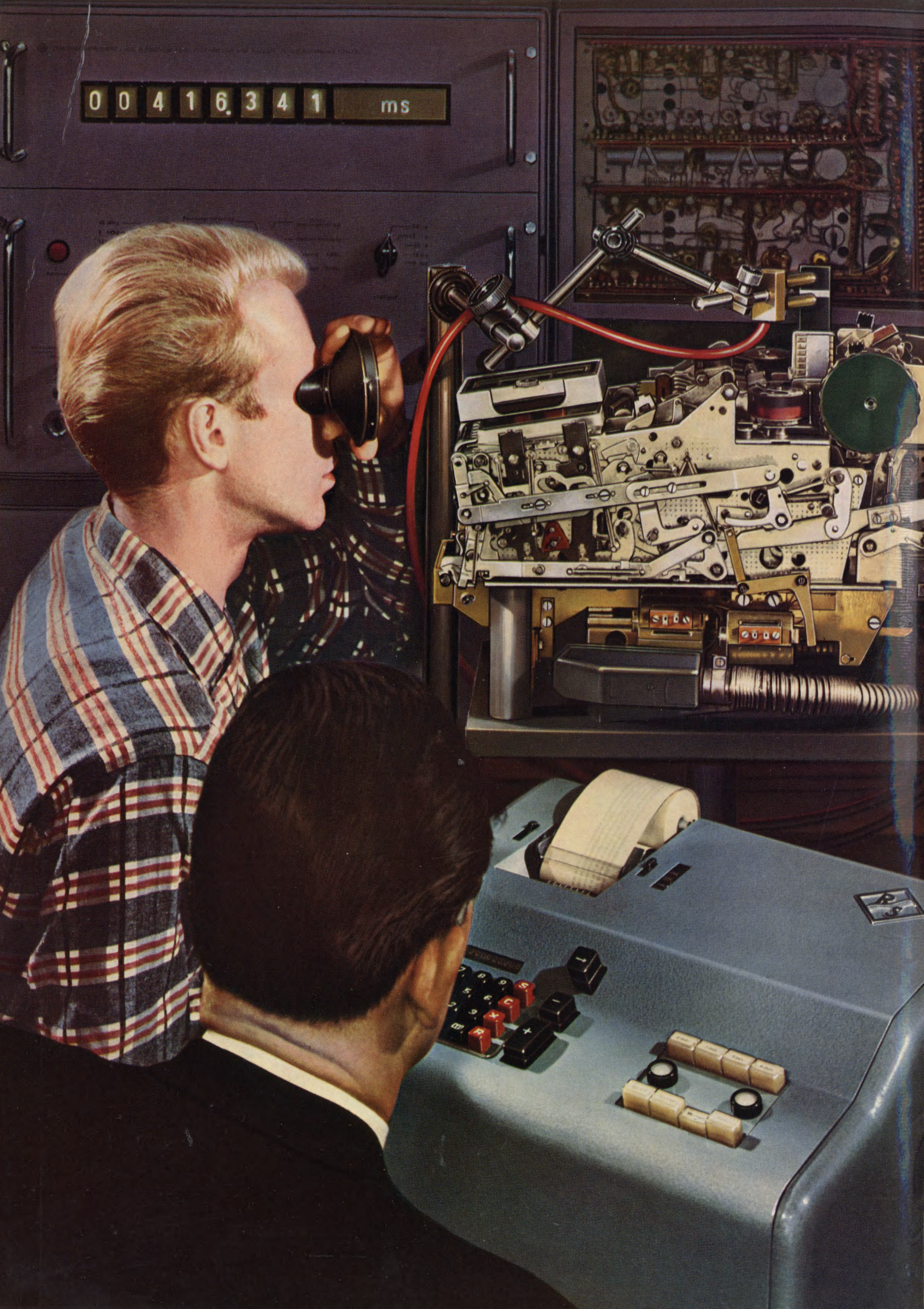


**ROHDE &
SCHWARZ**
MEASURING INSTRUMENTS



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PLEASE RETURN TO:

ROHDE & SCHWARZ - TEST EQUIPMENT CATALOGUE


Please note that this catalogue contains only the R&S measuring instruments with their auxiliary units and essential accessories.

If you are not yet familiar with the R&S type designations the Quick Index, which lists the instruments in accordance with their general function, will be helpful in locating the equipment of interest to you.

If you wish to obtain additional information on a particular instrument you are invited to contact your nearest distributor, who is named below. He will be glad to answer your questions, regardless of whether they concern technical problems or prices and delivery times. Your orders will take a short cut if you address them to "your" distributor and if you specify your requirements accurately. Please, always state the name of the instrument, the type designation and the order number. This order number is of particular importance inasmuch as it often identifies different versions of an instrument. For the most rapid service also contact "your" distributor. Finally, "your" distributor will readily help you solve your measurement problems. Naturally, our head office in Munich will always be pleased to offer you any advice and assistance you may require.

★ Instruments in this catalogue which are marked with this asterisk are not yet in the stage of serial production.

⚡ Instruments which are marked with this sign are designed for a-c supply operation. Generally, they can be adapted to 115, 125, 220 and 235 v at 47 to 63 cps.

 TEST ASSEMBLY FOR MEASURING AND RECORDING THE SPEED OF FAST MOVING PARTS OF MACHINES
Type-speed measurement on a high-speed printer with the Electronic Counter Type FELZ; the results are recorded with the Printer Type DMA.

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R&S MEASURING INSTRUMENTS – INDEX BY INSTRUMENT TYPE

Auxiliary units and accessories are not listed in this index but are mentioned in conjunction with the instrument to which they belong.

* An asterisk indicates that there are several models of this type.

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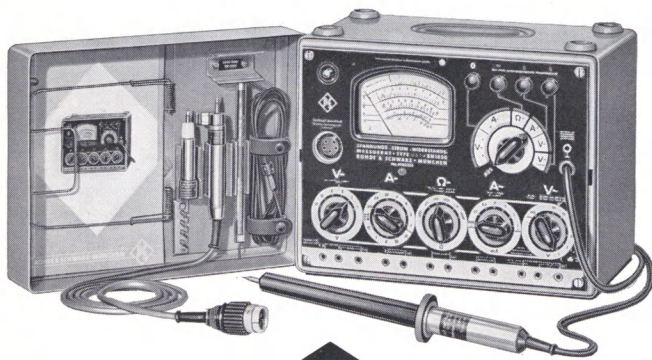
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R&S VOLTMETERS WITHOUT PREAMPLIFICATION



Electronic Multimeter Type URI

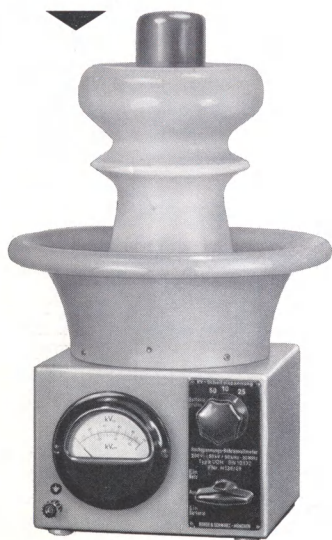
◊ *A-c voltage measurement* ◊: 0.1 to 300 v, peak response, calibration in rms values on a sine-wave (volts and db). Frequency range: 30 cps to 20 mc; with URI RF Probe: 10 kc to 250 mc (at 10 mc: 400 k Ω , 5.3 pf shunt). URI RF Probe Plug-in Divider extends range to 4.5 kv peak at 0.1 to 200 mc. ◊ *Alternating current measurement* ◊: 100 μ a to 1 amp at 30 cps to 2 mc, floating. ◊ *D-c voltage measurement* ◊: 20 mv to 1 kv; input resistance 10 M Ω or 100 M Ω , floating; URI DC Probe permits d-c voltage measurement without affecting a-c voltage conditions. URI 30-KV DC Probe makes possible measurement up to 30 kv, input resistance 1000 M Ω . ◊ *Direct current measurement* ◊: 2×10^{-9} amp to 1 amp, floating. ◊ *Resistance measurement* ◊: 10 Ω to 1000 M Ω . Maximum power into test item less than 3 mw. Connection to all inputs possible at the same time. R&S Standard Cabinet 35. ¶

► Order Number of the instrument: BN1050. Order Numbers of accessory units: URI RF Probe BN10501; URI RF Probe Plug-in Divider BN10502; URI 30-KV DC Probe BN10503; URI DC Probe BN10504.

High-Voltage Electronic Voltmeter 0.2 to 50 KV Type UDH

This instrument is intended for r-f voltage measurements on transmitter systems. It provides direct reading of peak voltages from 200 v to 50 kv in the frequency range 50 kc to 30 mc. Additional calibration in rms values. Operation from self-contained battery or a-c supply, switch-selected. Panel meter may be removed and connected to set via cable for remote measuring.

► Order Number BN10331.



UHF Millivoltmeter Type URV 1 KC to 2000 MC

In conjunction with its probe, the set is preferably used where very low capacitive loading of the check point is a must in the measurement of small r-f voltages. With the 10:1 plug-in divider, it is possible to measure r-f voltages from 30 mv to 100 v, the shunt capacitance being only 0.8 pf. Voltage measurement up to 300 mc. Coarse voltage indication possible up to 2000 mc, e.g. for relative measurements such as made to determine the attenuation. Lowest measurable voltage without divider, 3 mv. Four plug-in dividers, 3:1, 10:1, 25:1, 50:1, extend the voltage range to 500 v, max. The URV Insertion Unit, a practically non-reflecting line section permits accurate voltage measurements on coaxial cables up to 1600 mc. R&S Standard Cabinet 35. ¶

► Order Number for 50 Ω BN10910/50; for 60 Ω BN10910/60; for 75 Ω BN10910/75.

Small Level Meter Type UPK

For telephone and carrier frequency engineering.

► -2 to +3 nepers or -15 to +30 db in 4 steps; 30 cps to 20 kc. Input impedance 600 Ω or more than 10 k Ω , selectable: Order Number BN1061. -2 to +3 nepers in 4 steps; 3 kc to 600 kc; input impedances 75 Ω , 150 Ω , 174 Ω , 600 Ω , more than 4 k Ω , selectable: BN1062. -15 to +30 db in 4 steps, otherwise same as BN1062: BN10621.

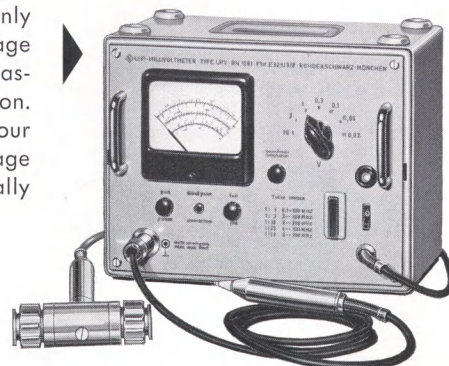
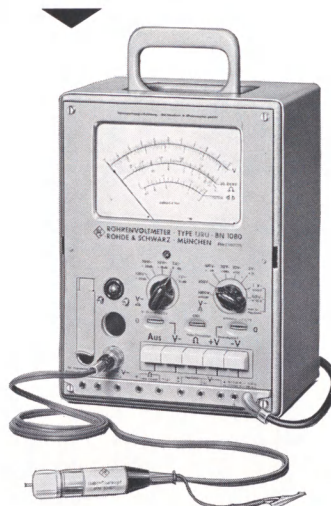


DC-UHF Electronic Multimeter Type URU 10 CPS to 2 KMC (2.4 KMC)

◊ *A-c voltage measurement* ◊: 0.1 to 1000 v peak response, calibration in rms values on a sine-wave (v and db). 10 cps to 2000 mc (up to 2400 mc as indicator). Extras: URU Probe Insertion Adapter; URU Probe Plug-in Divider 100:1 and URU Insertion Units: 1 to 30 v Dezifix B, 10 to 300 v Dezifix B, 10 v to 1 kv Dezifix D. ◊ *D-c voltages measurement* ◊: 5 mv to 1 kv. Input: 10 M Ω /100 M Ω , floating. Extras: URI DC Probes 1:1 and 100:1 for 30 kv. ◊ *Resistance measurement* ◊: 1 Ω to 1000 M Ω divided into 7 ranges. Maximum power into test item less than 2.5 mw. R&S Standard

Cabinet 35. ¶

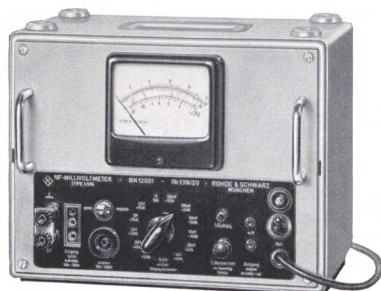
► Order Number of the instrument with URU Probe: BN1080. Order Numbers of accessories: URI 30-KV DC Probe BN10503; URI DC Probe BN10504; URU Probe BN10801; URU Probe Plug-in Divider BN10802, 40 db from 1 to 800 mc; URU Probe Insertion Adapter BN10803 in conjunction with URU Probe 0.1 to 100 v, 10 kc to 800 mc; URU Insertion Unit BN10804, 0.1 to 30 v, 10 kc to 1500 mc, Dezifix B; URU Insertion Unit BN10805, 3 to 300 v, 10 kc to 1200 mc, Dezifix B; URU Insertion Unit BN10805/2, 3 to 450 v, 10 kc to 1200 mc, Dezifix C; URU Insertion Unit BN10806, 30 to 1500 v, 10 kc to 1200 mc, Dezifix D.



R&S VOLTMETERS WITH PREAMPLIFICATION

AF Millivoltmeter Type UVN \uparrow 10 CPS to 100 KC \downarrow

This millivoltmeter permits accurate measurement of voltages in the range 20 cps to 20 kc if the balanced input is used and in the range 10 cps to 100 kc if the unbalanced input is used. The voltage range 0.1 mv to 300 v or -80 db to $+52$ db is covered in 12 sub-ranges. Due to its high impedance of $1\text{ M}\Omega$ the unbalanced input enables measurements to be made on high-impedance voltage sources. The



balanced input, which has an impedance of $20\text{ k}\Omega$, is intended primarily for measurements on telephone communication systems. Furthermore, the instrument can be used as an amplifier featuring a gain of 1000. R&S Standard Cabinet 35. \P Order Number BN12001; with neper calibration BN12002.

Video Millivoltmeter Type UVF \uparrow 10 CPS to 10 MC \downarrow

This new instrument is preferably used for measurements in television studios and on television transmitters. For example, in conjunction with the TV Demodulator Type AMF it enables the frequency response of transmission systems to be determined. Frequency range 10 cps to 10 mc. Voltage range 0.1 mv to 3 v (-80 to $+12$ db) or -8 to $+1.2$ nepers, resp., in 8 sub-ranges. The bridging type input permits measurements on $75\text{-}\Omega$ cables. The instrument measures the peak-to-peak voltage, square waves up to a duty cycle of 1:2000 being measurable; the scale is calibrated in rms values of a sine-wave. For video frequencies from 10 cps to 10 mc, the instrument can be used as an amplifier, its phase lag being a linear function of frequency. Output about 2 v_{pp} . R&S Std. Cabinet 56. \P Volt and db calibration: Order No. BN12015; neper: BN12016.

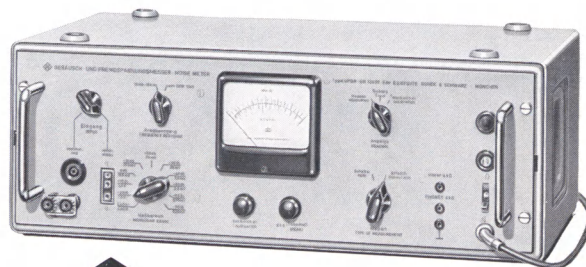
Tunable Indicating Amplifier Type UBM \uparrow 45 CPS to 600 KC \downarrow

This instrument indicates voltages from $3\text{ }\mu\text{v}$ to 100 v in the frequency range 45 cps to 600 kc. It is suitable above all where strong spurious voltages (harmonics, hum) are present and no absolute but only relative voltage measurements are required. Such is the case in substitution measurements, where high attenuations are encountered, and also in detecting small unbalance voltages in bridge circuits. Unwanted voltages can be suppressed more than 1:100 by tuning. The bandwidth in tuned operation is adjustable between 1 and 10%. In untuned operation, the instrument has all the features of a broadband amplifier. Harmonic distortion is less than 1.5%. R&S Standard Cabinet 46. \P Order Number BN12121/2.

RF Millivoltmeter Type UVH \uparrow 30 CPS to 30 MC \downarrow

A millivoltmeter of exceptionally large bandwidth. Voltage range $100\text{ }\mu\text{v}$ to 100 v (-80 to $+42$ db) or -8 to $+4.8$ nepers, resp., in 10 sub-ranges. By a built-in high-pass filter the frequency range of 30 cps to 30 mc can be reduced to a band of 10 kc to 30 mc in order to avoid errors due to a-f voltages. This instrument performs practically all voltage measurements necessary in carrier-frequency and television engineering. The unbalanced input is designed as a probe having an input impedance of about $500\text{ k}\Omega$ shunted by 10 pf. The instrument can be used as broadband amplifier, its phase lag being a nearly linear function of frequency up to about 10 mc. R&S Standard Cabinet 56. \P

► Volt and db calibration: Order No. BN12021; neper: BN12022.



Noise and Level Meter Type UPGR \uparrow 30 CPS to 15 KC \downarrow

The Type UPGR measures the signal and noise levels of radio communication systems in the range 30 to 15,000 cps. Peak or rms indication can be switch-selected. Also switch-selected is a facility for making measurements either weighted (noise measurements) or unweighted (level measurements). The weighting is according to CCIR recommendations of 1949. The range of measurement is covered in 10 steps: for peak indication, -90 to $+20$ db or -11 to $+2$ N; for rms indication, -85 to $+20$ db or -9.5 to $+2$ N. Accurate integration of high noise peaks when indicating rms values due to its high overdriving capability. Balanced and unbalanced inputs. R&S Standard Cabinet 55. ► Decibel calibration: Order Number BN12038. Neper calibration: Order Number BN12039.



Microvoltmeter Type UVM \uparrow 20 CPS to 1 MC \downarrow

Measures voltages and levels from about $10\text{ }\mu\text{v}$ to 10 v or $+22$ db, or to $+1.2$ neper, resp., in the frequency range 20 cps to 1 mc (unbalanced input) or 30 cps to 600 kc (balanced input). A built-in low-pass filter permits reducing the frequency range. The voltage and level ranges are divided into 10-db or 1-neper steps, resp. In addition, the instrument can be used as broadband amplifier in the range 20 cps to 1 mc, the phase lag being a linear function of frequency; output voltage at full-scale meter deflection about 1 v unbalanced. R&S Standard Cabinet 56. \P ► Volt and db calibration: Order Number BN12011; neper calibration: BN12012.



R&S TEST RECEIVERS



VHF Monitoring Receiver $\uparrow 30$ to 180 MC \downarrow Type ESM 180 VHF Monitoring Receiver $\uparrow 85$ to 300 MC \downarrow Type ESM 300

Superheterodyne receivers suitable for radio monitoring and radio interference control. These receivers enable the reception of both frequency- and amplitude-modulated signals. An output for connecting an oscilloscope permits pulse-modulated carriers and noise spectra up to 100 kc bandwidth to be investigated. In conjunction with a standardizing oscillator, this receiver can also be used for measuring field strength. A beat-frequency oscillator, switch-selected i-f and a-f bandwidths, i-f conversion in narrow-band operation and amplitude limiting in the i-f section contribute to the versatility of this set. R&S Standard Cabinet 56. †

► Order Number Type ESM 180 BN 15073/2, ESM 300 BN 15074/2.

Selective Microvoltmeter $\uparrow 10$ KC to 30 MC \downarrow Type USVH

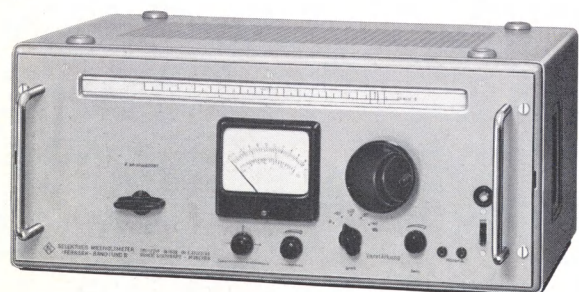
Measurement range $0.2 \mu\text{v}$ to 1 v or -134 to $+2$ db, extreme selectivity, switch-selected bandwidth of 500 cps or 5 kc, precise incremental frequency control, selectable input impedance of 50Ω , 60Ω , 70Ω , 75Ω , 150Ω or $500 \text{ k}\Omega$ in shunt with 20 pf, voltage and db ranges divided into 13 sub-ranges make the Type USVH extremely versatile. R&S Standard Cabinet 57. †

► Order Number BN 1521.

Selective VHF Voltmeter \uparrow TV Bands I, III, IV, V \downarrow Type USVF

The Selective VHF Voltmeter is a tunable relative-voltage meter specially designed for measuring voltage ratios up to 60 db in television engineering. It is basically a superheterodyne receiver with a band-pass filter at the input and high selectivity in the i-f section. The reading is taken from a meter calibrated in rms values and fed from a peak-responding rectifier. The voltmeter reading enables, for example, the frequency response and the envelope distortion to be plotted point-by-point. For the television bands I and III (channels 1 to 11): voltage range 2 mv to 5 v, i-f bandwidth 8 kc. For television band IV and V (channels 14 to 53): voltage range 3 mv to 1.5 v, i-f bandwidth 8 kc. R&S Standard Cabinet 56. †

► Order Number: For Band I and III, 50Ω : BN 1528/50; for 60Ω : BN 1528/60. For Band IV and V, 50Ω : BN 15285/50; for 60Ω : BN 15285/60.



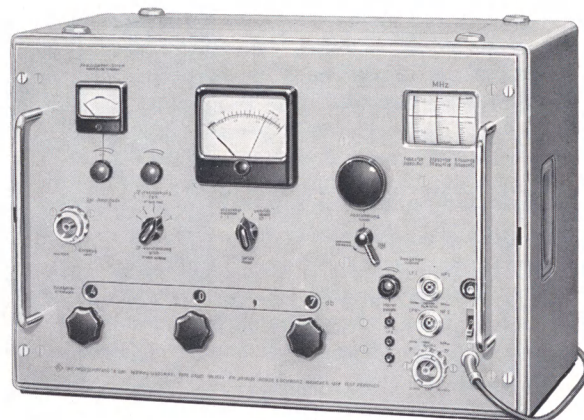
Selective VHF Microvoltmeter $\uparrow 25$ to 400 MC \downarrow Type USVV \star

The Selective VHF Microvoltmeter Type USVV has a frequency range of 25 to 400 mc and therefore fills the frequency gap between the Selective Microvoltmeter Type USVH (10 kc to 30 mc) and the UHF Test Receiver Type USVD (280 to 940 mc). A demodulator and a discriminator have been provided for aural monitoring of amplitude- and frequency-modulated signals. The measurement range of the input voltage extends from $10 \mu\text{v}$ to 1 v at full-scale deflection. The bandwidth of 200 kc or 10 kc can be switch-selected. R&S Standard Cabinet 58. †

UHF Test Receiver $\uparrow 280$ to 940 MC \downarrow Type USVD

This receiver is preferably employed for measuring voltage ratios; i.e., it is a relative-voltage meter permitting accurate measurements to be made on filters and attenuators as well as of VSWR's and reflection coefficients. It is a superheterodyne receiver incorporating a built-in attenuator box. Extension of the measurement range up to 4600 mc is possible, the input voltage being mixed with harmonics of the local oscillator. The rectified i-f voltage is read on a meter featuring relative calibration for a normal and for an expanded range. The noise figure in the fundamental frequency range is 15 to 16 db in the case of a voltage source of 50 to 60Ω internal impedance. R&S Standard Cabinet 510. †

► 50- Ω model: Order Number BN 1523/50; 60Ω : BN 1523/60.



UHF Test Receiver $\uparrow 0.9$ to 2.7 KMC \downarrow Type USVU

High sensitivity! Absolute power measurement, accurate relative voltage measurement! Separate i-f output! A superheterodyne receiver with broadband input, covering the frequency range 0.9 to 2.7 kmc in 2 sub-ranges. Measurement of power ratios up to 60 db is possible with the r-f panel meter and the built-in attenuator box (smallest step 0.1 db). Noise figure of set when connected to a voltage source of 50 to 75Ω impedance is about 14 db. Measurement range (full-scale deflections): -80 dbm to -20 dbm . Accuracy, relative: $\pm 1\%$ of the attenuator setting $\pm 0.1 \text{ db}$; absolute: $\pm 2 \text{ db}$. Field-strength measurements are possible in conjunction with the UHF Parabolic Aerial Type HA 262/1. The receiver has two intermediate frequencies, 250 mc and 25 mc. The lower intermediate frequency is available at a separate output and thus permits all measurements of modulation characteristics at 25 mc. Input and i-f output equipped with R&S connector Dezifix B. R&S Standard Cabinet 5101. †

► Order Number BN 1524.

VHF Receiver $\uparrow 30$ to 330 MC \downarrow Type ESG

The VHF Receiver Type ESG is a communication and monitoring receiver for the entire VHF range from 30 to 330 mc. It permits receiving the various radio services such as FM broadcasting, fixed and mobile radio stations using narrow-band frequency modulation, FM directional radio for CF telephony, and aircraft radio employing amplitude modulation. Special features for these purposes are an adjustable squelch circuit, a noise limiter, and a beat-frequency oscillator for operation on keyed continuous waves. With certain qualifications imposed by the maximum possible i-f bandwidth of 300 kc, the receiver lends itself also to monitoring television and pulse modulated transmitters. The set has all facilities and properties required for the direct measurement of frequencies, of field strengths — in conjunction with an aerial and a standard oscillator — of frequency deviations, and of the percentage modulation. Moreover, it can be used as a laboratory microvoltmeter. Electronic regulation of all operating voltages ensures that the frequency accuracy and gain remain constant even with supply voltages varying as much as $\pm 10\%$. Thus accurate measurements and recordings over long periods of time are possible. Special calibration circuits permit continuous monitoring of the essential characteristics of the receiver and their readjustment to the nominal value. The equipment consists of the receiver shown in the picture at the right and of a separate power supply. All operating controls are on the front panel of the receiver. R&S Standard Cabinet 5121. $\text{R}\&\text{S}$ E BN 15075.

► Order Number BN 15075.

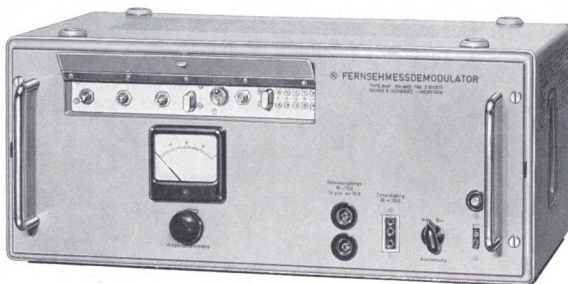


Radio Interference Indicator Type EZS

Permits a VHF radio interference test assembly complying with the German VDE 0876 recommendation to be set up in conjunction with a receiver which has no special facilities for radio interference measurements. Suitable for intermediate frequencies of 10.7 mc, 15.7 mc or 21.4 mc, the Type EZS is connected to the i-f output of the receiver. Input impedance is 60 Ω , input requirement 3 to 8 mv, adjustable. Indication: Two weightings; overdrive check; average or peak. Built-in attenuator: 60 Ω , 0 to 330 mc, 70 db in 1 db steps. R&S Standard Cabinet 55. $\text{R}\&\text{S}$ E BN 15131.

► Order Number BN 15131.

R&S MODULATION TEST SETS



Frequency Deviation Meter Type FMV $\uparrow 20$ to 300 (600) MC \downarrow

Provides direct reading of the frequency deviation in the ranges 0–10/30/60/150 kc, of the modulation depth 0–10/30% for transmitters modulated by 30 to 15,000 cps and of the relative centre frequency departure up to ± 100 kc. It serves as a high-grade measuring demodulator in development and production and is used for continuous monitoring of FM transmitters. Direct measurement with transmitter frequencies from 20 to 300 mc; up to at least 600 mc in operation with harmonics. At the output sockets, the amplified audio frequency is available with a level sufficient for measurements in conjunction with other measuring instruments. Examples of application of the Frequency Deviation Meter Type FMV: determination of the non-linear distortion of the modulation in co-operation with the Distortion Meter Type FTZ, measurement of the weighted and unweighted noise voltages of a transmitter with the Noise and Level Meters Types UPGR and UPGF or with AF Millivoltmeter Type UVN. The dimensions of the Type FMV: R&S Standard Cabinet 56. $\text{R}\&\text{S}$ E BN 4620.

► Order Number BN 4620.

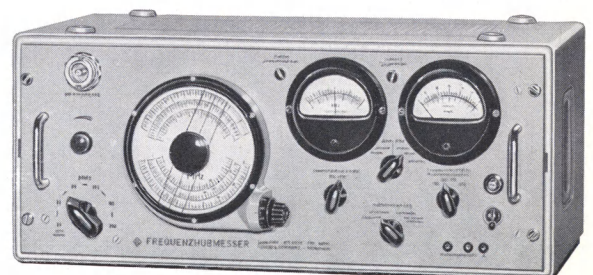
TV Demodulator Type AMF \uparrow Bands I, III, IV \downarrow

A high-grade TV monitoring receiver (crystal-controlled local oscillator) with measuring demodulator for sound and vision signals. It permits measurement and checking of all the characteristics of the vision transmitter as well as measurement and monitoring of the individual factors of the sound quality. R&S Standard Cabinet 56. $\text{R}\&\text{S}$ E BN 46411; 170–230 mc model: BN 46413; 470–600 mc model: BN 46414.

Directional Coupler Type NAF \uparrow TV Bands I and III \downarrow

Permit energy to be branched off directly from the aerial feeder of transmitters, for the TV demodulator or other purposes. Coupling attenuation 40–50 db, directivity 50 db, impedance 60 Ω , R&S Dezifix connectors B or D. Please enquire for other characteristic impedances or connectors.

► 47–68 mc, 1 kw: Order Number BN 464113; 10 kw: BN 464115.
170–230 mc, 1 kw: Order Number BN 464133; 10 kw: BN 464135.



R&S FIELD-STRENGTH METERS

Distant-Zone Field-Strength Meter $\uparrow 0.1$ to 100 MC \downarrow Type HHF (3 Models)

Capable of accurately checking all kinds of propagation phenomena and receiving conditions. Built-in standardizing oscillator permits exact reproduction of the field being measured. Operates from battery or a-c supply, selectable. Tripod is supplied with the instrument. Dimensions of the receiver without frames 425 x 325 x 295 mm.

Frequency range (4 sub-ranges)	Measuring range Linear	(3 sub-ranges each) Logarithmic	Accuracy	Order Number
► 0.1 to 3 mc	2 to 2000 $\mu\text{V}/\text{m}$	2 to $10^5 \mu\text{V}/\text{m}$	$\pm 20 \%$	BN 1500
► 2.5 to 25 mc	1 to 1000 $\mu\text{V}/\text{m}$	1 to $10^5 \mu\text{V}/\text{m}$	$\pm 20 \%$	BN 1501
► 20 to 100 mc	2 to 5000 $\mu\text{V}/\text{m}$	2 to $10^5 \mu\text{V}/\text{m}$	$\pm 30 \%$	BN 1502

Compass: Order Number BN 9820. Telescope with compass: Order Number BN 9822. Cable-input Assembly for HHF: Order Number BN 9830.

Rod aerial for
Field-Strength Meter
Type HHF

VHF Field Strength Indicator
Type HUZ



VHF Field-Strength Indicator $\uparrow 47$ to 225 MC \downarrow Type HUZ

A handy test set for indicating the field strength of AM or FM transmitters in the range 47 to 225 mc. Measurement ranges: 1 μV to 1 mV, 100 μV to 100 mV. Accuracy ± 6 db. Operates from gas-tight, built-in storage batteries. Capable of being recharged with the transistor-controlled charger. Buffer operation is also possible. A search coil can be connected to the instrument for the testing of interference voltages, particularly useful for vehicle interference. Built-in loudspeaker and connectors for headphones. Dimensions of the receiver 250 x 210 x 120 mm.

► Order Number BN 15012/2. Charger for HUZ: BN 150126. Search Coil for HUZ: BN 150127. Leather carrying case for HUZ: BN 150128.

Near-Zone Field-Strength Meter $\uparrow 0.1$ to 100 MC \downarrow Type HHN (3 Mod.)

Portable, battery-operated set for measuring the direction and strength of the magnetic component of the field of a transmitter. Measurement range 0.03 to 20 v/m in 5 sub-ranges. Accuracy 10 to 15%. Tripod and carrying case supplied with the set. Dimensions of the receiver 240x235x150 mm.

- Frequency range 0.1 to 3 mc (4 sub-ranges) Order Number BN 1540.
- Frequency range 2.5 to 25 mc (4 sub-ranges) Order Number BN 1541.
- Frequency range 20 to 100 mc (3 sub-ranges) Order Number BN 1542.

Field-Strength Meter $\uparrow 87$ to 470 MC \downarrow Type HFD

The frequency range is divided into 4 sub-ranges. Suitable for AM and FM. Indicates r-f or a-f voltage, switch-selected. Measurement ranges: linear 10 μV to 10 mV, logarithmic 10 to $10^6 \mu\text{V}$, each in 3 sub-ranges. Accuracy $\pm 20 \%$. Built-in standardizing oscillator. Operates from the Battery and Vibrator Unit Type NBU supplied with the set or from a 220v a-c supply, 50 to 100 cps. Dimensions of the receiver 500x210x300 mm.

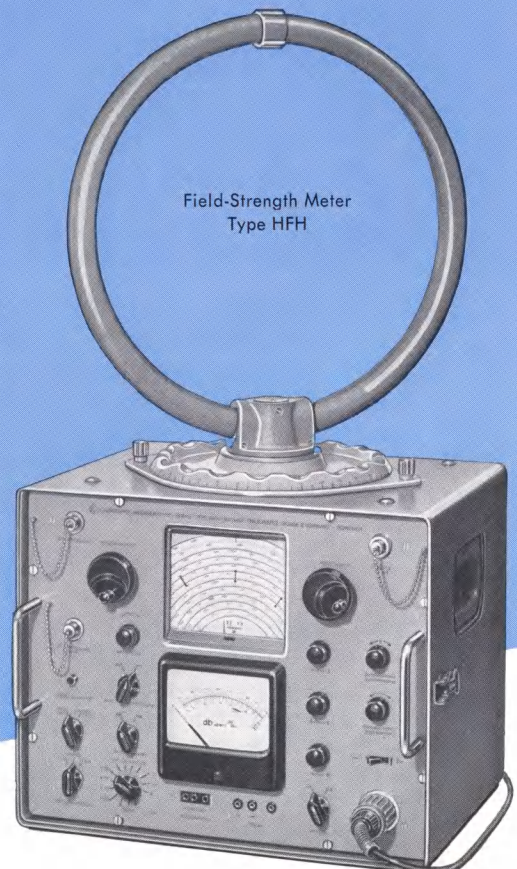
► Order Number for the complete Field-Strength Meter with tripod and swivel head: BN 1503.

Field-Strength Meter $\uparrow 0.1$ to 30 MC \downarrow Type HFH

Enables direct measurement of field strength. The frequency range is divided into 10 sub-ranges. Calibration of the set is possible at any measuring frequency. Direct readings in terms of field strength are obtainable without the use of a calibration chart. Input impedance of the set 60 Ω . Range of indication 20 db linear and 40 db logarithmic; gives average value and peak value weighted to CISPR recommendation; switch-selected. As field-strength meter: measurement range 0 to 120 db related to 1 $\mu\text{V}/\text{m}$, in 10-db steps. Accuracy better than ± 1.5 db. As a selective valve-microvoltmeter: measurement range -20 db to +100 db related to 1 μV , in 10-db steps. Accuracy ± 1 db. IF bandwidth selectable, ± 100 cps, ± 500 cps, ± 4 kc. Operates from battery or a-c supply, selectable. Dimensions of the receiver 430x345x365 mm.

► Order Number BN 15001.

Field-Strength Meter
Type HFH



Tunable VHF Amplifier Type ASV $\uparrow 30$ to 300 MC \downarrow

Tuned amplifier covering a frequency range of 30 to 300 mc without switching. Contains three stages and three tuned circuits using combined L-C tuning. In operation as signal generator the first amplifier functions as a free-running oscillator whose output is amplified by the two other stages. Output voltage between 3 mv and 3 v into 60 Ω . Range of indication between 50 mv and 3 v. Input requirement for full drive of the amplifier is 50 mv into 60 Ω . With small voltage applied the gain is greater than 100. Built-in demodulator enables, for example, convenient checking for unwanted modulations or interruptions in oscillator output signals. Input requirement in operation as a coarse-frequency meter or as a receiver is 0.5 mv. External modulation and internal modulation with 1000 cps, 0 to 90 %, is possible in operation as signal generator or amplifier. Modulation depth is indicated. Modulation voltage of 1 kc, 0 to 10 v into 600 Ω is available. Low envelope distortion and slight incidental FM. Numerous applications are possible as amplifier for signal generators, as modulator, limiting amplifier and frequency multiplier. Small and handy. R&S Standard Cabinet 35. ☞

► Order Number BN 1372.

VLF Wide-Band Amplifier Type ANT $\uparrow 2$ CPS to 20 KC \downarrow

The Wide-Band Amplifier Type ANT has an output power of 2 w even at low frequencies. Input voltage requirement is 8 v at 1 M Ω input impedance. This set may be used as a power amplifier for signal generators. It is particularly well suited for use with our RC Generator Type SRN which has a frequency range of 2 cps to 20 kc. Both sets feature the same frequency range and, together, form an excellent power signal source. The various fields of application of the Type ANT are: amplification in general, in electroacoustics, in electronic measurements, in control engineering, etc. The output of this very-low-frequency wide-band amplifier is balanced and floating; output impedances of 150 Ω and 600 Ω can be switch-selected. The output voltage can be measured by a built-in valve voltmeter. The frequency range is 2 cps to 20 kc with distortion less than 2 %. The frequency response referred to 1 kc is -0.5 db at 10 kc, -3.0 db at 20 kc. R&S Standard Cabinet 46. ☞

► Order Number BN 13140.

TV Modulation Amplifier Type ABF $\uparrow 5$ CPS to 10 MC \downarrow

Primarily designed as an auxiliary unit for the Standard Signal Generator Type SMAF. In this case, its purpose is to amplify the picture and synchronizing signals of 0.5 v_{pp} without amplitude or phase distortion and to supply the Type SMAF with a modulation signal adjustable from zero towards positive values. The frequency range is 5 cps to 10 mc; the gain is 16, max. The built-in voltmeter indicates either the no-signal d-c level or the modulation voltage output. R&S Standard Cabinet 53. ☞

► Order Number BN 13711.

Differentiating Amplifier Type FZD

Produces a d-c output proportional to rate of change, both in magnitude and polarity, of voltage quantities. This differentiating amplifier is used in technical control problems to give a time-derivative of the controlled condition in systems using compound action, e.g. in conjunction with the Mains Frequency Indicator Type FZN, for frequency control of power generating systems. Sensitivity ± 5 , ± 10 , ± 25 , ± 50 ma / $\frac{\text{volt}}{\text{sec}}$. Response time 1, 2, 5, 10 sec, selectable. The input impedance of the Type FZD is infinite and floating. R&S Standard Cabinet 55. ☞

► Order Number BN 47096.

Peak Limiter Type ABR $\uparrow 40$ CPS to 15 KC \downarrow

This peak limiter can be employed in all audio-frequency communication systems which are susceptible to overdriving, e.g. in high-quality radio equipment and sound recordings. Distortion and frequency response of this instrument are very low. The input level is +6 db or +12 db, switch-selected. The compression is such that the output level remains under +7.5 db or +13.5 db when overdriven by 10 db. Gain of 0 db. The frequency range is 40 to 15,000 cps. R&S Standard Cabinet 53. ☞

► Order Number BN 1601.



Power Amplifier Type ATN $\uparrow 30$ CPS to 20 KC \downarrow

The Power Amplifier Type ATN delivers a nominal power of 50 w at an output voltage of 110 v_{rms} or 220 v_{rms} . Frequency range is 30 cps to 40 kc. Response at 20 kc is down 0.6 db; at 40 kc, down 3 db. The nominal input voltage is about 0 db (0.775 v), the limiting values are about -10 db to +30 db (0.25 to 25 v). A panel meter for valve checking and output voltage indication is provided. The output voltage is available at screw terminals, at the built-in earthed-contact socket and at the rear-panel multi-way connector. The Power Amplifier Type ATN has such a low output impedance that the output voltage variations between full load and no load are less than 10 %. It is used in conjunction with standard frequency generators for feeding synchronous motors and synchro-controlled systems. Owing to its wide frequency range, its low distortion and its low output impedance it can be used as an amplifier for laboratories or as a high-fidelity audio-frequency amplifier. R&S Standard Cabinet 57. ☞

► Order Number BN 13193.

Times-Ten Frequency Multiplier XVD $\uparrow 3$ to 30 MC $\times 10$ \star

The Frequency Multiplier Type XVD supplies an output frequency between 30 and 300 mc when a voltage between 0.1 and 5 v with a frequency of one-tenth the desired output frequency is applied to its input. It is simply necessary to adjust one knob so that a deflection is obtained on the output indicator. It is impossible to obtain a multiplication factor other than ten since the multiplier stages of this set are automatically cut off when the input frequency is not one-tenth of the frequency tuned for. Unwanted frequencies are attenuated by more than 60 db. The output voltage is indicated and adjustable between 0.3 mv and 3 v. An oscillator can be switched into circuit to make the times-ten frequency multiplier a signal generator which is capable of covering 30 to 300 mc with a maximum output voltage of 3 v. External and internal (1 kc) amplitude modulation from 0 to 90 %; %-modulation indication. A few possible applications are: Extending the range of signal generators and frequency meters up to 300 mc, times-ten multiplier and amplifier for crystal oscillators, generation of wide frequency swings and measurement of unwanted frequency swings at 3 to 30 mc with Frequency Deviation Meter Type FMV. Mixers for frequency measurements are under development. R&S Standard Cabinet 571. ☞

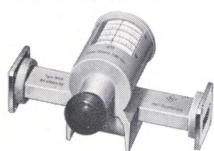
► Order Number BN 44421.

R&S STANDARD ATTENUATORS, ATTENUATOR PADS, DELAY LINES, UNIDIRECTIONAL TRANSMISSION LINES

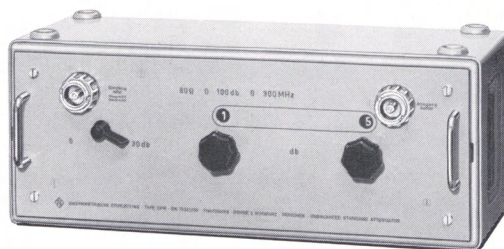
Type DPF BN 18062/50
0 to 4000 mc



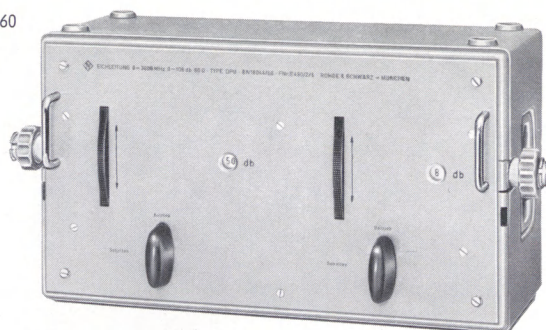
Type DPCV BN 180911/90
8500 to 12,400 mc



Type DPR BN 18042/60
0 to 300 mc



Type DPU BN 18044/60
0 to 3000 mc



Attenuator Boxes and Attenuators

Designation	Type	Charac- teristic Impedance	Attenuation	Smallest Increment	VSWR	Accuracy	Frequency Range	Max. Input Power	Order Number
Bal. Std. Attenuator ¹	DPR	600 Ω	0–15 N	0.01 N	—	$\pm 1\% \pm 0.005$ N	0–2 mc	1.5 w	BN 18021
Bal. Std. Attenuator ¹	DPR	600 Ω	0–130 db	0.1 db	—	$\pm 1\% \pm 0.05$ db	0–2 mc	1.5 w	BN 18022
Unbal. Std. Attenuator	DPR	60 Ω	0–15 N	0.01 N	—	$\pm 1\% \pm 0.005$ N	0–30 mc	1.5 w	BN 18013/60
Unbal. Std. Attenuator	DPR	75 Ω	0–15 N	0.01 N	—	$\pm 1\% \pm 0.005$ N	0–30 mc	1.5 w	BN 18013/75
Unbal. Std. Attenuator	DPR	600 Ω	0–15 N	0.01 N	—	$\pm 1\% \pm 0.005$ N	0–2 mc	1.5 w	BN 18011
Unbal. Std. Attenuator	DPR	60 Ω	0–130 db	0.1 db	—	$\pm 1\% \pm 0.05$ db	0–30 mc	1.5 w	BN 18014/60
Unbal. Std. Attenuator	DPR	75 Ω	0–130 db	0.1 db	—	$\pm 1\% \pm 0.05$ db	0–30 mc	1.5 w	BN 18014/75
Unbal. Std. Attenuator	DPR	600 Ω	0–130 db	0.1 db	—	$\pm 1\% \pm 0.05$ db	0–2 mc	1.5 w	BN 18012
Unbal. VHF Std. Attenuator	DPR	50 Ω	0–100 db	1 db	1.15	$\pm 0.1–0.8$ db	0–300 mc	0.4 w ³	BN 18042/50
Unbal. VHF Std. Attenuator	DPR	60 Ω	0–100 db	1 db	1.15	$\pm 0.1–0.8$ db	0–300 mc	0.4 w ³	BN 18042/60
Unbal. VHF Std. Attenuator	DPR	75 Ω	0–100 db	1 db	1.15	$\pm 0.1–0.8$ db	0–300 mc	0.4 w ³	BN 18042/75
UHF Attenuator	DPF	50 Ω	10 db	—	< 1.10	± 0.2 db	0–1000 mc	0.5 w ⁴	BN 18082/50
UHF Attenuator	DPF	60 Ω	10 db	—	< 1.10	± 0.2 db	0–1000 mc	0.5 w ⁴	BN 18082/60
UHF Attenuator	DPF	75 Ω	10 db	—	< 1.10	± 0.2 db	0–1000 mc	0.5 w ⁴	BN 18082/75
UHF Standard Attenuator	DPU	50 Ω	0–109 db	1 db	< 1.25	± 0.3 db ⁵	0–3000 mc	0.4 w ³	BN 18044/50
UHF Standard Attenuator	DPU	60 Ω	0–109 db	1 db	< 1.25	± 0.3 db ⁵	0–3000 mc	0.4 w ³	BN 18044/60
UHF Attenuator	DPF	50 Ω	5 db	—	< 1.04 ²	± 0.05 db ²	0–4000 mc	0.5 w ⁴	BN 18060/50
UHF Attenuator	DPF	60 Ω	5 db	—	< 1.04 ²	± 0.05 db ²	0–4000 mc	0.5 w ⁴	BN 18060/60
UHF Attenuator	DPF	50 Ω	10 db	—	< 1.04 ²	± 0.1 db ²	0–4000 mc	0.5 w ⁴	BN 18061/50
UHF Attenuator	DPF	60 Ω	10 db	—	< 1.04 ²	± 0.1 db ²	0–4000 mc	0.5 w ⁴	BN 18061/60
UHF Attenuator	DPF	50 Ω	20 db	—	< 1.04 ²	± 0.15 db ²	0–4000 mc	0.5 w ⁴	BN 18062/50
UHF Attenuator	DPF	60 Ω	20 db	—	< 1.04 ²	± 0.15 db ²	0–4000 mc	0.5 w ⁴	BN 18062/60
Variable Flap									
Attenuator (WR 90)	DPCV	—	0.5–45 db	0.1 db	< 1.10	—	8.5–12.4 kmc	1 w	BN 180811/90
do. (WR 137)	DPCV	—	0–30 db	0.1 db	< 1.10	—	5.4–8.2 kmc	1 w	BN 180811/137
do. (WR 159)	DPCV	—	0–30 db	0.1 db	< 1.10	—	4.6–7.0 kmc	1 w	BN 180811/159
do. (WR 229)	DPCV	—	0.5–45 db	0.1 db	< 1.10	—	3.5–5.0 kmc	1 w	BN 180811/229
do. calib. (WR 90)	DPCV	—	0.5–40 db	0.1 db	< 1.10	± 0.2 db	8.5–12.4 kmc	1 w	BN 180911/90
do. calib. (WR 137)	DPCV	—	0.5–40 db	0.1 db	< 1.10	± 0.2 db	5.4–8.2 kmc	1 w	BN 180911/137
do. calib. (WR 159)	DPCV	—	0.5–40 db	0.1 db	< 1.10	± 0.2 db	4.6–7.0 kmc	1 w	BN 180911/159
do. calib. (WR 229)	DPCV	—	0.3–40 db	0.1 db	< 1.10	± 0.2 db	3.5–5.0 kmc	1 w	BN 180911/229

¹ Brought-out balance point, balance accuracy 0.5%

² at 2400 mc

³ resp. 300 v pulse

⁴ resp. 500 v pulse

⁵ at vernier steps

Integral-Sine-Square Filter

Type PBT Forms bell-shaped pulses out of unit impulses and may be used, for example, for measurements on transmission lines and television links. Cutoff frequency with response down 3 db is 4.5 mc. Increase in rise time to 0.08 μ sec ± 0.01 μ sec, characteristic impedance 75 Ω , pass-band attenuation 6.2 db, group delay time (200 kc to 5 mc) 90 μ sec. R&S Standard Cabinet 14.
► Order Number BN 4940.

Adjustable Delay Line Type DLK

A low-pass delay network for producing a definite time delay between input and output signal. 950- Ω model: Total delay 31 μ sec in steps of 0.1 μ sec, accuracy $\pm 5\%$, characteristic impedance 950 $\Omega \pm 5\%$, attenuation 6 db, cutoff frequency between 3 and 0.3 mc. 75- Ω model: Total delay 1.105 μ sec in steps of 0.005 μ sec, accuracy $\pm 5\%$, characteristic impedance 75 Ω , return loss greater than 20 db, transmission loss 3 db max., cutoff frequency higher than 10 mc. Dimensions of both models: R&S Standard Cabinet 35.
► Type DLK 950- Ω model: Order Number BN 17910.
Type DLK 75- Ω model: Order Number BN 17920.

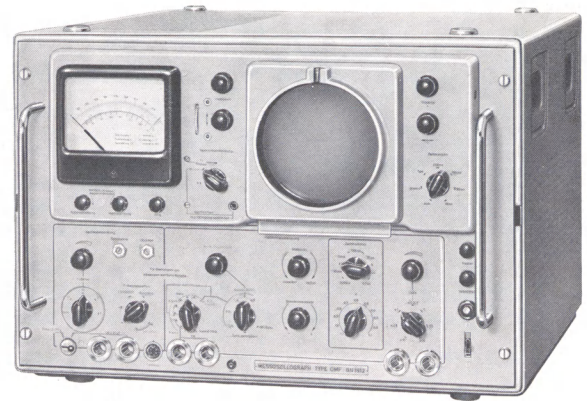
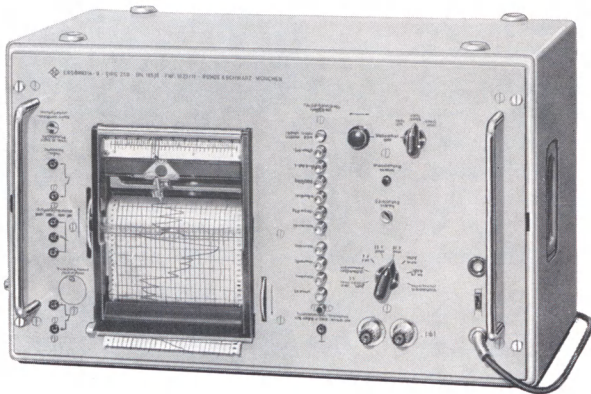
Unidirectional Transmission Line

Type DRC Prevents the disturbing effect of reflections back to the voltage source by absorbing the reflected wave. Waveguide cross section WR 90. Frequency range 8.5 to 9.5 kmc. Attenuation: forward, less than 1 db; backward, greater than 20 db. VSWR less than 1.3. Power handling capacity: 10 w in forward direction, 0.2 w in reverse direction. Dimensions: 50 mm dia. x 270 mm.
► Order Number BN 175111/90.

Precision Oscilloscope ∇ DC to 20 MC ∇ Type OMF

Special features make this oscilloscope suited for the requirements of television engineering. It is also suited for pulse, radar and control engineering. These features include: keyed d-c restoration for maintaining blanking level; provision for line selection with output for picture monitor; Y magnifier for hum/noise and linearity measurements; internal sync by V or H pulses from composite signals, external sync by V or H pulses derived from combined or separate V and H sync signals. The set also contains directly connected X and Y amplifiers, Y-amplifier sensitivity 4 mv/cm max.; wide range of sweep times, 1 sec/cm down to 0.1 μ sec/cm; repetition frequency up to 750 kc; jitter-free display; accurate voltage measuring facility for absolute and relative measurements; versatile connection possibilities through paralleled and bridging-type inputs; built-in time marker generator. Dimensions 540 x 370 x 455 mm. ∇

► Order Number BN1912.



DC Recorder ENOGRAPH-G Type ZSG

The Enograph-G records d-c voltages, i.e., all electrical and mechanical processes that can be represented by a d-c voltage. Records voltages between 0 and 300 v in 5 sub-ranges with continuous adjustment. Input impedance 10 to 50 M Ω ; 5×10^6 or $1 \times 10^{11} \Omega$ selectable in 3-v range. Pen speed 250 msec for full-scale travel. 10 chart speeds from 20 mm/h to 10 mm/sec can be selected by a push-button. In addition, the chart can be driven by any external rotating device. The measured quantity is traced by a ball-point pen, an ink pen or an electrode on a strip of ordinary paper, metallized paper or wax paper 120 mm in width. The zero can be shifted to the left, right or centre of chart. Thus, difference voltages of either polarity can be recorded. R&S Standard Cabinet 59. ∇

► Order Number BN18531; for 60-cps supply: BN 18531/60 Hz.

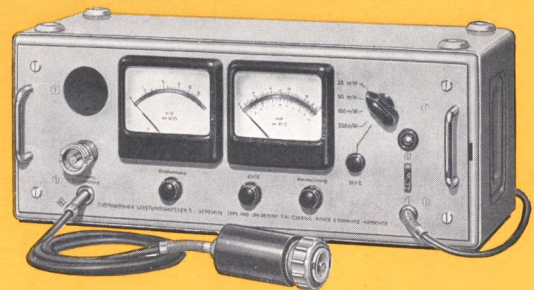
R&S POWER METERS

Microwave Power Meter Type NRD ∇ DC to 3200 or 4500 MC ∇

In contrast with r-f power meters operating with peak responding voltmeters, this instrument measures the electric power directly in terms of heat developed in an input resistor. This input resistor provides the termination at the point of measurement. The temperature rise in the precision resistor is measured by a bridge circuit which is completely isolated from the precision resistor. Thus the power measured cannot be used in another part of a test setup as is the case when using insertion-type power meters. The power reading is practically independent of frequency up to the maximum frequency, 3200 or 4500 mc, depending upon model. This instrument is ideally suited as a voltage standard, e.g. for absolute calibration of diode voltmeters in the UHF range and the lower part of the SHF range. A built-in d-c voltage source and a reference panel meter permit checking the calibration and improving the accuracy of individual measurements beyond the values specified below.

∇ **Power Range 1 to 200 mW** ∇ in 4 sub-ranges. Accuracy $\pm 2.5\%$ of f.s.d. Frequency range d-c to 3200 mc. VSWR: 1.02 up to 1000 mc; 1.03 up to 2000 mc; 1.05 up to 3200 mc. Input impedance 50 or 60 Ω . Input connector Dezifix B. Dimensions: R&S Standard Cabinet 45. ∇

► 50- Ω model: Order Number BN2412/50; 60 Ω : BN2412/60.



Measurement of powers up to $\nabla 10 \text{ kW} \nabla$ is possible in conjunction with load resistors. See page 10.

∇ **Power Range 0.1 to 10 mW** ∇ in 4 sub-ranges. Accuracy $\pm 5\%$ of f.s.d. The frequency range is higher than that of model BN2412/...; it is up to 4500 mc. VSWR: 1.04 up to 2000 mc; 1.1 up to 4500 mc. Input impedance 50 or 60 Ω . Input connector Dezifix B. R&S Standard Cabinet 45. ∇

► 50- Ω model: Order Number BN2413/50; 60 Ω : BN2413/60.

R&S POWER METERS / continued

Examples of Power Range Extension for Microwave Power Meters Type NRD

Microwave Power Meter		Attenuator		Load Resistor		Total Attenuation	Extended Range	
Type	Order No.	Type	Order No.	Type	Order No.			
NRD	BN 2412/60	—	—	RBD	BN 33661/60	10 db	10 mw	to 2 w
NRD	BN 2412/60	—	—	RBD	BN 33664/60	30 db	1 w	to 100 w
NRD	BN 2412/60	—	—	RD 1/60	—	40 db	10 w	to 1 kw
NRD	BN 2412/60	—	—	RD 10/60	—	50 db	100 w	to 10 kw
NRD	BN 2413/60	—	—	RBD	BN 33661/60	10 db	10 mw	to 100 mw
NRD	BN 2413/60	—	—	RBD	BN 33663/60	20 db	100 mw	to 1 w
NRD	BN 2413/60	DPF	BN 18061/60	RBD	BN 33663/60	30 db	1 w	to 10 w
NRD	BN 2413/60	DPF	BN 18061/60	RBD	BN 33664/60	40 db	10 w	to 100 w
NRD	BN 2413/60	—	—	RD 10/60	—	50 db	100 w	to 1 kw
NRD	BN 2413/60	DPF	BN 18061/60	RD 10/60	—	60 db	1 kw	to 10 kw

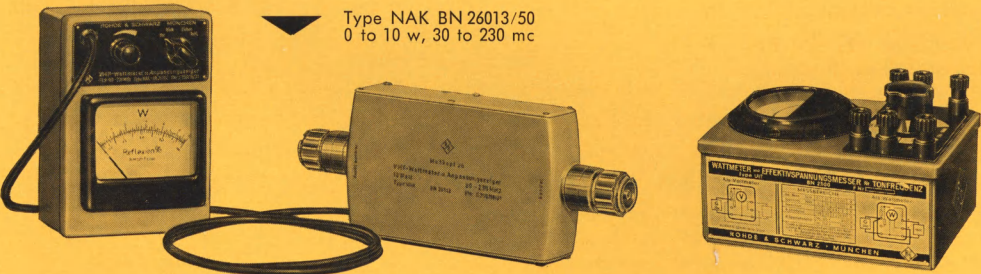
For details on attenuators and load resistors with output socket please refer to page 8 and page 11.

Wattmeter and Matching Indicator Types NAK, NAU and NAD

◊ Power 0 to 10/30/100/300/1000 w; frequency 30 to 230, 100 to 600, 470 to 2800 mc ◊
 Measuring and monitoring equipment for all power and matching measurements on antennae, transmitters, cables, etc. Measurement ranges, see table below. The set is comprised of an indicator unit and measuring head to be inserted into a transmission line. The measuring head contains two directional couplers and is connected to the indicator unit via a cable. Switch-selected indication of the incident or reflected power directly in watts. The minimum incident power for direct reading of reflection coefficients from 0 to 100 % is tabulated below. Dezifix B connectors used. Dimensions: measuring head 110 x 45 x 270 mm, indicator unit in R&S Standard Cabinet 14. Please make enquiry when sets over 1 kw, with or without an automatic transmitter switch-off facility, are desired.

Type	Frequency Range mc	Range of high Incident and Reflected Power w	Range of low Reflected Power w	Minimum Incident Power Requirement w	Accuracy %	VSWR	Order Number ***
VHF Wattmeter and Matching Indicator							
NAK	30-230	0-10	—	7	± 5	< 1.02	BN 26013
NAK	30-230	0-30	—	20	± 5	< 1.02	BN 26023
NAK	30-230	0-100	0-10	70	± 5	< 1.02	BN 26033
NAK	30-230	0-300	0-30	200	± 5	< 1.01	BN 26043
NAK	30-230	0-1000	0-100	700	± 5	< 1.01	BN 26053
UHF Wattmeter and Matching Indicator							
NAU	100-600	0-10	—	7	± 5	< 1.02	BN 26113
NAU	100-600	0-30	—	20	± 5	< 1.02	BN 26123
NAU	100-600	0-100	0-10	70	± 5	< 1.02	BN 26133
NAU	100-600	0-300	0-30	200	± 5	< 1.01	BN 26143
NAU*	100-600	0-1000	0-100	700	± 5	< 1.01	BN 26153
NAD	470-2800	0-10	—	**	± 10	< 1.03	BN 26213
NAD	470-2800	0-30	—	**	± 10	< 1.03	BN 26223
NAD	470-2800	0-100	0-10	**	± 10	< 1.03	BN 26233
NAD*	470-2800	0-300	0-30	**	± 10	< 1.03	BN 26243
NAD*	470-2800	0-1000	0-100	**	± 10	< 1.03	BN 26253

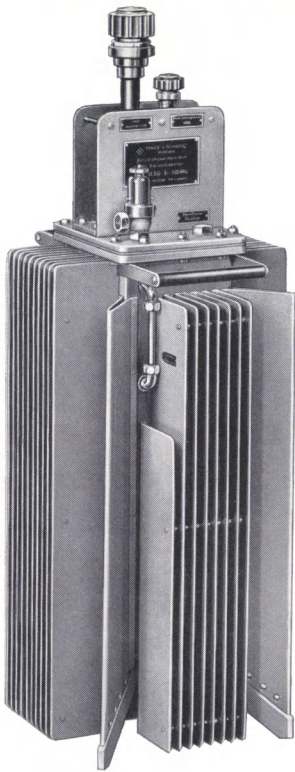
* Dezifix C connectors. ** These sets have no facility for direct reflection-coefficient indication.
 *** The Type NAK and NAU instruments are available for the characteristic impedances of 50 Ω, 60 Ω and 75 Ω, those of the Type NAD for 50 Ω and 60 Ω. When ordering, please state the desired characteristic impedance after a fraction bar behind the order number; e.g. BN 26113/50.



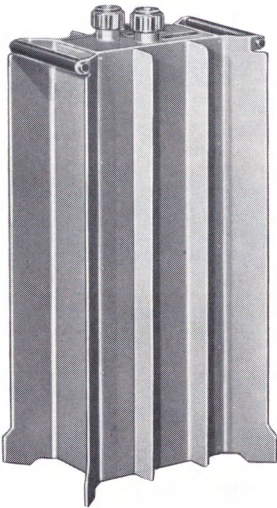
Type NAK BN 26013/50
0 to 10 w, 30 to 230 mc

Wattmeter and R.M.S. Voltmeter for Audio Frequency Type UIT

A dynamometer for the frequency range 30 cps to 10 kc. Power range 0.1 to 500 w in 8 sub-ranges; rms voltage range 25 to 250 v in 2 sub-ranges. Continuous overload capacity of current and voltage circuits is 100 %. Dimensions: R&S Standard Cabinet 14.
 ▶ Order Number BN 2300.



Type RD 1/60, 60 Ω, 1 kw, d-c to 600 mc



Type RBD BN 33664/60, 60 Ω, 100 w, d-c to 600 mc



Type RBD BN 33663/60, 60 Ω, 20 w, d-c to 2.4 kmc



Type RBD BN 33662/60, 60 Ω, 20 w, d-c to 600 mc

R&S STANDARD RESISTORS, LOAD RESISTORS



Type RBD BN 33661/60
60 Ω , 2 w, d-c to 2.4 kmc



Type RBC BN 334011/90
1 w, 8.2 to 12.4 kmc

Calibrated Decade Resistor Type RGM

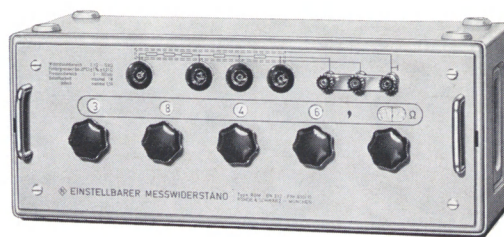
0.1 Ω to 12 k Ω $\pm 0.1\%$ $\pm 0.01 \Omega$; d-c to 300 kc;
max. 1 w, 0.5 amp. R&S Standard Cabinet 45.

► Order Number BN 332.

Calibrated Decade Resistor Type RGN

1 Ω to 120 k Ω $\pm 0.1\%$ $\pm 0.05 \Omega$; d-c to 20 kc;
max. 1 w, 0.1 amp. R&S Standard Cabinet 45.

► Order Number BN 331.



Due to their special type of winding, these resistors feature very low residual inductance and capacitance (time constant up to 1 k Ω : less than 2.3×10^{-8}). Their stability is high owing to natural and artificial aging.

Standard Resistors and Load Resistors

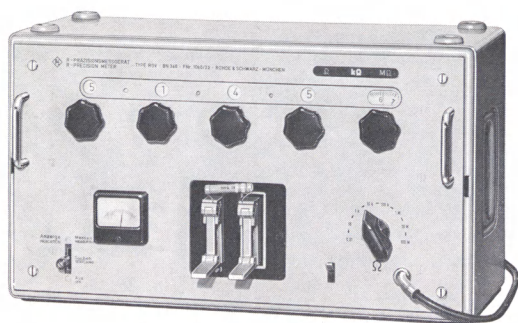
Designation	Type	Characteristic Impedance Ω	Frequency Range kmc	Power Rating w	VSWR	Dimensions (mm) or Waveguide Cross-section	Connector	Output Attenuation db	Order Number
UHF Standard Resistor	RMD	50	0–2.4	1	< 1.03	44 dia. x 74	Dezifix B	—	BN 33526/50
UHF Standard Resistor	RMD	60	0–2.4	1	< 1.03	44 dia. x 74	Dezifix B	—	BN 33526/60
UHF Standard Resistor	RMD	75	0–2.4	0.5	< 1.03	44 dia. x 74	Dezifix B	—	BN 33526/75
SHF Standard Resistor	RMC	50	0–5	1	< 1.03	44 dia. x 70	Dezifix B	—	BN 33527/50
SHF Standard Resistor	RMC	60	0–5	1	< 1.03	44 dia. x 70	Dezifix B	—	BN 33527/60
UHF Load Resistor	RBD	50	0–2.4	2	< 1.08 ¹	48 dia. x 140	Dezifix B ³	10 \pm 0.2	BN 33661/50
UHF Load Resistor	RBD	60	0–2.4	2	< 1.08 ¹	48 dia. x 140	Dezifix B ³	10 \pm 0.2	BN 33661/60
UHF Load Resistor	RBD	50	0–0.6	20	< 1.10 ²	425 x 105 x 80	Dezifix B ³	20 \pm 0.2	BN 33662/50
UHF Load Resistor	RBD	60	0–0.6	20	< 1.10 ²	425 x 105 x 80	Dezifix B ³	20 \pm 0.2	BN 33662/60
UHF Load Resistor	RBD	50	0–2.4	20	< 1.10 ¹	115 dia. x 280	Dezifix B ³	20 \pm 0.3 ¹	BN 33663/50
UHF Load Resistor	RBD	60	0–2.4	20	< 1.10 ¹	115 dia. x 280	Dezifix B ³	20 \pm 0.3 ¹	BN 33663/60
UHF Load Resistor	RBD	50	0–0.6	100	< 1.07 ²	500 x 260 x 200	Dezifix B ³	30 \pm 0.2	BN 33664/50
UHF Load Resistor	RBD	60	0–0.6	100	< 1.07 ²	500 x 260 x 200	Dezifix B ³	30 \pm 0.2	BN 33664/60
UHF Load Resistor	RD 1/50	50	0–0.6	1000	< 1.05 ²	1080 x 400 x 370	Dezifix C ³	40 \pm 0.2 ²	(Type RD 1/50)
UHF Load Resistor	RD 1/60	60	0–0.6	1000	< 1.05 ²	1080 x 400 x 370	Dezifix C ³	40 \pm 0.2 ²	(Type RD 1/60)
UHF Load Resistor	RD 3/50	50	0–0.6	3000	< 1.05 ²	400 dia. x 1415	Dezifix C ³	50 \pm 0.2 ²	(Type RD 3/50)
UHF Load Resistor	RD 3/60	60	0–0.6	3000	< 1.05 ²	400 dia. x 1415	Dezifix C ³	50 \pm 0.2 ²	(Type RD 3/60)
UHF Load Resistor	RD 10/50	50	0–0.6	10,000	< 1.05 ²	1200 x 800 x 300	Dezifix D ³	50 \pm 0.2 ²	(Type RD 10/50)
UHF Load Resistor	RD 10/60	60	0–0.6	10,000	< 1.05 ²	1200 x 800 x 300	Dezifix D ³	50 \pm 0.2 ²	(Type RD 10/60)
Waveguide Std. Resistor	RBC	—	3.2– 4.9	1	< 1.02	WR 229	Flange	—	BN 334011/229
Waveguide Std. Resistor	RBC	—	4.6– 7.0	1	< 1.02	WR 159	Flange	—	BN 334011/159
Waveguide Std. Resistor	RBC	—	5.4– 8.2	1	< 1.02	WR 137	Flange	—	BN 334011/137
Waveguide Std. Resistor	RBC	—	8.2–12.4	1	< 1.02	WR 90	Flange	—	BN 334011/90
Waveguide Load Resistor	RBC	—	3.2– 4.9	20	—	WR 229	Flange	—	BN 334211/229
Waveguide Load Resistor	RBC	—	3.2– 4.9	250	—	WR 229	Flange	—	BN 334311/229
Waveguide Load Resistor	RBC	—	4.6– 7.0	15	—	WR 159	Flange	—	BN 334211/159
Waveguide Load Resistor	RBC	—	4.6– 7.0	250	—	WR 159	Flange	—	BN 334311/159
Waveguide Load Resistor	RBC	—	5.4– 8.2	15	—	WR 137	Flange	—	BN 334211/137
Waveguide Load Resistor	RBC	—	5.4– 8.2	200	—	WR 137	Flange	—	BN 334311/137
Waveguide Load Resistor	RBC	—	8.2–12.4	15	—	WR 90	Flange	—	BN 334211/90
Waveguide Load Resistor	RBC	—	8.2–12.4	200	—	WR 90	Flange	—	BN 334311/90

¹ Up to 500 mc.

² Up to 300 mc.

³ Output with Dezifix B provided for attenuated power; e.g. for connection of the Microwave Power Meter Type NRD.

R&S IMPEDANCE METERS, SLOTTED AND NON-SLOTTED LINES



Precision Resistance Meter $\uparrow 0.01 \Omega$ to $100 M\Omega$ \downarrow Type RGV

The Precision Resistance Meter Type RGV measures resistances over the extremely wide range of 0.01Ω to $100 M\Omega$. It operates on the Wheatstone bridge principle. The accuracy is $0.1\% \pm 0.001 \Omega$ in the range 0.01Ω to $10 M\Omega$ and $\pm 0.5\%$ in the range $10 M\Omega$ to $100 M\Omega$. Measurement is made with direct current. The power dissipated in the item under test is less than 12 mw; thus the resistance values of delicate circuit components may be determined. This instrument combines the high accuracy of a conventional bridge circuit with the most modern features providing ease of operation. The set is very rugged and can be operated even by non-technical personnel. R&S Standard Cabinet 46. ∇

► Order Number BN340.

Impedance Meter Type RSP $\uparrow 800$ CPS \downarrow

This instrument permits impedance measurements at audio frequencies and covers the range 0.3Ω to $1 M\Omega$ in 12 sub-ranges. It is suitable, e.g., for determining the impedance of loudspeakers and of input and output transformers at 800 cps. Practical as direct indicating instrument in production measurements. After a simple change-over, the set can be used for measuring d-c resistances. R&S Standard Cabinet 35. ∇

► Order Number BN3540.

Dissipation Factor Meter Type VKS $\uparrow 1$ MC \downarrow

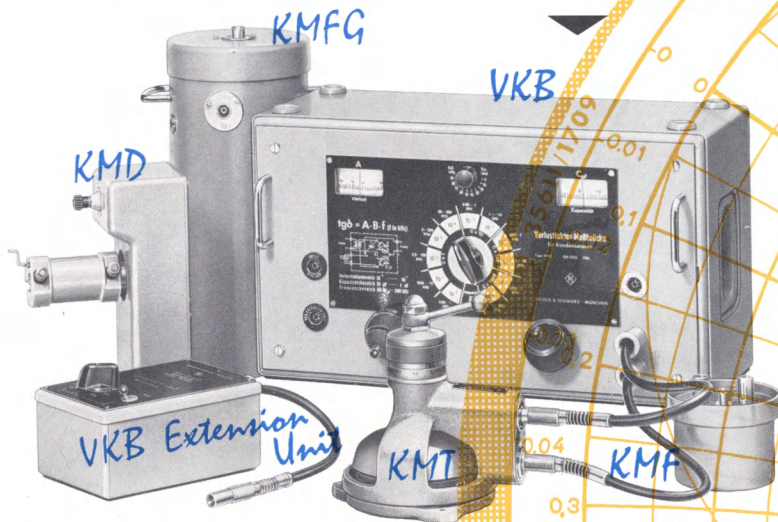
This direct-reading instrument is designed mainly for testing and sorting out a great number of capacitors or dielectric specimens which are nearly equal in capacitance. The dissipation factor is indicated directly in terms of parts in 10^4 ; it can be read without any auxiliary units and does not require any correction. The main advantage which this instrument has over those using the customary resonance method lies in the fact that it does not necessitate accurate tuning prior to each individual reading. The capacitance of the item under test may deviate as much as $\pm 20\%$ from the adjusted value without causing appreciable error in the dissipation factor readings. This ensures a high sorting speed and therefore economy in production tests. Test clips are supplied with the instrument to facilitate production testing. The Type VKS is used to advantage in the chemical industry for routine checking of the composition and quality of liquids by means of dissipation factor measurements. The dissipation factor ($\tan \delta$) range is 0 to 25 parts in 10^4 with an accuracy of ± 2 parts in 10^4 . The frequency of measurement is 1 mc. The dimensions of Dissipation Factor Meter Type VKS: R&S Standard Cabinet 46. ∇

► Capacitance range 10–100 pf: Order Number BN3530; capacitance range 100–1000 pf: BN3531.



Dielectric Test Bridge Type VKB $\uparrow 50$ CPS to 300 KC \downarrow

Measures capacitances from 10 pf to $1 \mu f$ and dissipation factors from 5 to 3000 parts in 10^4 . Its high accuracy and wide coverage make for great versatility of the instrument. The frequency of measurement may lie between 50 cps and 300 kc. A suitable voltage source is the R&S RC Generator Type SRM; the R&S Tunable Indicating Amplifier Type UBM suggests itself as null detector. The VKB Extension Unit permits extending the dissipation factor range to a value of 1. The Guard-Ring Capacitor Type KMT provides for measuring dielectric constants and dissipation factors of non-liquid insulants. The insulation characteristics of outside coverings on circular or ribbon-shaped wires can be measured with the aid of the Wire Test Jig Type KMD. Liquid samples are measured in the Liquid-Specimen Containers Types KMF and KMFG. R&S Standard Cabinet 46.



► Type VKB: Order Number BN3520; VKB Extension Unit: BN35208; Guard-Ring Capacitor Type KMT: BN5711; Wire Test Jig Type KMD: BN5731; Liquid-Specimen Container Type KMF: BN5721/2; Large Liquid-Specimen Container Type KMFG: BN5722.

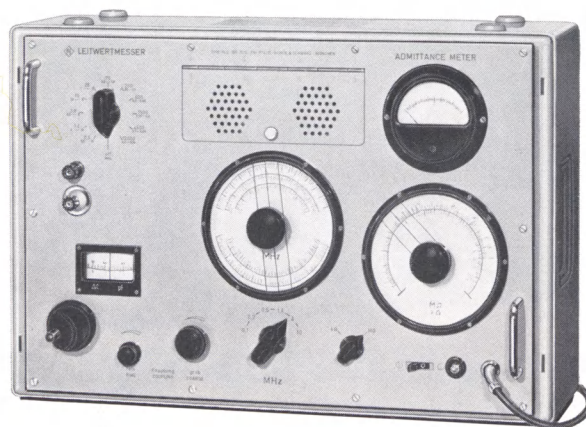
Q Meter Type QVH $\uparrow 50$ KC to 30 MC \downarrow

The Q Meter Type QVH measures the Q of coils with inductances of $1 \mu h$ to $100 m h$ in the frequency range from 50 kc to 30 mc. It covers a Q range of 5 to 600 in 3 sub-ranges. The instrument contains a test circuit capacitance which can be adjusted to any value between 50 pf and 12,000 pf and which permits examining a coil over a frequency range of about 1:15, so that an extensive Q characteristic can be plotted. Further examples of application are the determination of the dissipation factor of capacitors and the determination of the dielectric constant and the dissipation factor of liquids. R&S Std. Cabinet 46. ∇

► Order Number BN3672.

Admittance Meters Types VLU and VLUK $\uparrow 0.1$ to 100 MC \downarrow

These two instruments facilitate measuring the resistive and reactive components of admittances. The Type VLU covers the frequency range 0.1 to 10 mc and measures admittances with a reactive component corresponding to a value between 0 and ± 1000 pf and a resistive component between 1 k Ω and 200 M Ω . The Type VLUK measures admittances with a reactive component corresponding to a value between 0 and ± 100 pf and a resistive component of 1 k Ω to 10 M Ω ; it covers the frequency range 10 mc to 100 mc. The two instruments find a great number of uses in the entire field of radio-frequency engineering, particularly in development and research work. Important examples of application are the measurement of the losses in elements of resonant circuits and the determination of circuit Qs. These measurements are possible even if the resonant circuit under test is permanently mounted in an instrument. Losses introduced by various components of an apparatus, such as switches, valve sockets, shields, etc., can be measured separately and accurately. Dimensions of the two instruments, which are very similar: 540 x 370 x 240 mm. $\#$



The picture shows the Admittance Meter Type VLU. The Admittance Meter Type VLUK looks the same except for a few details.

► VLU Order Number BN 3510; VLUK Order Number BN 3511.

Z-g-Diagrams Types ZDU and ZDD $\uparrow 30$ to 300 MC, 30 to 420 MC and 300 to 2400 MC \downarrow

These instruments provide for measurement of impedances and transmission parameters with respect to resistive and reactive components or magnitude and phase. The measured value can be read directly on a diagram, no calculation or graphic evaluation being necessary. The Type ZDU models cover the frequency range 30 to 300 mc or 30 to 420 mc, the Type ZDD models cover the range 300 to 2400 mc. Impedance range: 0.02 Z_0 to 50 Z_0 , where Z_0 is 50 Ω , 60 Ω or 75 Ω . Attenuations between 0 and 30 db and phase shifts between 0 and 360° can be measured on four- and multi-terminal networks. The measurement range for phase angles between two voltages of the same frequency is 0 to $\pm 180^\circ$. The voltages to be compared need not be of equal magnitude, they must only lie within the specified voltage range of about 5 mv to about 20 mv.

► Order Numbers of the different models:

Type ZDU, 30 to 300 mc, 50- Ω model	Order No. BN 3561/50
Type ZDU, 30 to 300 mc, 60- Ω model	Order No. BN 3561/60
Type ZDU, 30 to 300 mc, 75- Ω model	Order No. BN 3561/75
Type ZDU, 30 to 420 mc, 50- Ω model	Order No. BN 35610/50
Type ZDU, 30 to 420 mc, 60- Ω model	Order No. BN 35610/60
Type ZDU, 30 to 420 mc, 75- Ω model	Order No. BN 35610/75
Type ZDD, 0.3 to 2.4 kmc, 50- Ω model	Order No. BN 3562/50
Type ZDD, 0.3 to 2.4 kmc, 60- Ω model	Order No. BN 3562/60

► Order Numbers of the charts:

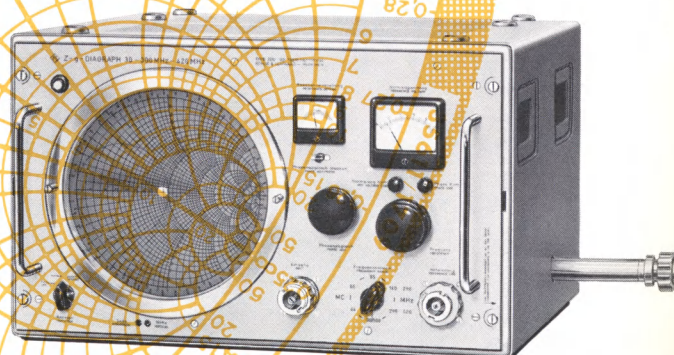
Complex reflection coefficient chart	BN 35611/1657
Transfer constant chart (calibrated in db)	BN 35611/1658
Impedance-admittance chart (magnitude and phase)	BN 35611/1659
Imped.-admitt. chart (resist. and react. components)	BN 35611/1709
Impedance-admittance chart, 3 times enlarged	BN 35611/2692

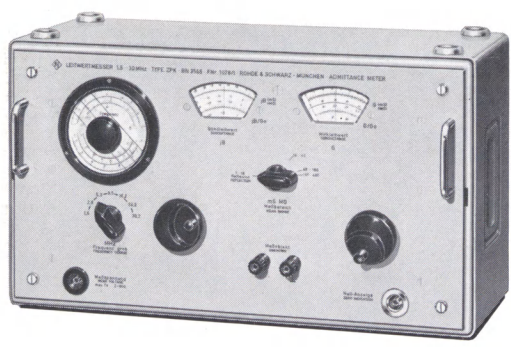
► Recommended accessories, supplied to order:

4-terminal feed unit for ZDU/ZDD, 50 Ω	BN 35615/550
4-terminal feed unit for ZDU/ZDD, 60 Ω	BN 35614/660
4-terminal feed unit for ZDU/—, 75 Ω	BN 35615/880
Two 2-term. meas. cables for ZDU/ZDD, 50 Ω , 1 m	BN 35613/50/1
Two 2-term. meas. cables for ZDU/ZDD, 50 Ω , 2 m	BN 35613/50/2
Two 2-term. meas. cables for ZDU/—, 50 Ω , 5 m	BN 35613/50/5
Two 2-term. meas. cables for ZDU/ZDD, 60 Ω , 1 m	BN 35612/1
Two 2-term. meas. cables for ZDU/ZDD, 60 Ω , 2 m	BN 35612/2
Two 2-term. meas. cables for ZDU/—, 60 Ω , 5 m	BN 35612/5
Two 2-term. meas. cables for ZDU/—, 75 Ω , 1 m	BN 35613/80/1
Two 2-term. meas. cables for ZDU/—, 75 Ω , 2 m	BN 35613/80/2

The yellow print shows the impedance characteristic of a wide-band aerial in actual size.

The effect of a line between the Z-g-Diagram and the item under test, e.g. an aerial, can be compensated for by connecting a line of the same electrical length to an auxiliary input. The Z-g-Diagram permits plotting, for example, the complete wide-band impedance or admittance characteristic of such objects as aerials, transformers, absorbers, filters, etc. Charts which can easily be interchanged ensure ease and speed of recording. Dimensions Z-g-Diagrams Type ZDU and ZDD: 540 x 340 x 480 mm. $\#$





Impulse Reflectometer Type ZUPI \uparrow Bands I, II, III \downarrow

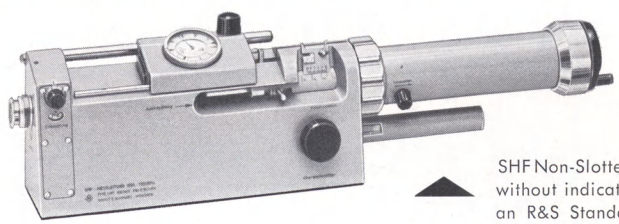
Used for investigating reflections on cables by pulse-modulated carrier frequencies under conditions that would be encountered in actual operation. VHF pulses with a 0.1 μ sec duration and a 50-kc repetition frequency are applied to the test item input. Reflected pulses are received if any discontinuities are present. The incident and reflected waves are displayed upon an oscilloscope with sufficient bandwidth. The distance to the discontinuity can thus be localized at electrical lengths between 50 and 2000 m, the resolvable distance between two consecutive discontinuities being 15 m electrical length. Measurable amplitude between 0.6 and 100 % of incident pulse. Frequency ranges 47 to 68 mc, 81 to 102 mc, 174 to 223 mc. In addition, d-c pulses may be used, e.g. for determining the Z_0 of cables. Band-stop filters serve to suppress any unwanted signals. An extension cable enables faults less than 50 m away to be located. R&S Standard Cabinet 510.

- Type ZUPI 50 Ω : BN 35683/50; 60 Ω : BN 35683/60.
- VHF Band-Stop Filter 87 to 100 mc, 50 Ω : Order Number BN 356811/50; 60 Ω : BN 356811/60. Extension cable, 50 Ω , 35 m: BN 356812/50; 60 Ω , 40 m: BN 356812/60.

VHF Slotted Line Type LMM and UHF Slotted Line Type LMD

The slotted line is the simplest instrument for measuring wave-lengths and for determining impedances at high frequencies. The VHF Slotted Line Type LMM is 2 metres in length and is thus designed for the frequency range 80 to 300 mc; the UHF Slotted Line Type LMD covers the frequency range 300 to 3000 mc.

- Order Numbers: VHF Slotted Line Type LMM, characteristic impedance 50 Ω : BN 3916/50; do. 60 Ω : BN 3916/60. UHF Slotted Line Type LMD, 50 Ω : BN 3926/50; do. 60 Ω : BN 3926/60; do. 75 Ω : BN 3926/75.



SHF Non-Slotted Line Type LMC without indicating amplifier in an R&S Standard Cabinet 35.

SHF Non-Slotted Line Type LMC \uparrow 1650 to 6350, 6950, 7450 MC \downarrow

The principle of the SHF non-slotted line makes possible measurements of VSWR on match-terminated lines and also resonance measurements on lines terminated with reactive loads as encountered, e.g. in a test assembly for investigating the characteristics of dielectric materials.

- Frequency range 1650 to 6350 mc, 50 Ω : Order Number BN 3931/50; frequency range 1650 to 6950 mc, 60 Ω : BN 3931/60; frequency range 1650 to 7450 mc, 75 Ω : BN 3931/75.

Admittance Meter Type ZPK \uparrow 1.5 MC to 30 MC \downarrow

This instrument is designed to determination the parameters of unbalanced 2- and 4-terminal networks in the frequency range 1.5 to 30 mc. The measured result refers to the equivalent shunt circuit, the conductance and susceptance being read on two separate scales. The range of both scales is 1 to 600 millimhos. A special balun can be supplied for measurements on balanced items. Reflection coefficient measurements in the range 0 to 100 % can be made by comparison of two voltages. A suitable voltage source is the R&S Power Signal Generator Type SMLR; the R&S Microvoltmeter Type USVH is recommended as indicator. Dimensions: R&S Standard Cabinet 46.

- Admittance Meter Type ZPK: Order Number BN 3565. Balun Adapter to ZPK: Order Number BN 35651.

Reflectometer Type ZUP \uparrow 10 MC to 600 MC \downarrow

This instrument provides for very accurate determination of the reflection coefficient or the matching of a load to a coaxial line. Frequency range 10 to 600 mc. Reflection coefficient range 0.5 to 100%. Impedance range 0.1 to 10 Z_0 , where Z_0 is 50 Ω or 60 Ω . 3 Dezifix B connectors. Dimensions: 220 x 100 x 110 mm.

- Reflectometer Type ZUP, 50- Ω model: Order Number BN 3569/50; Type ZUP, 60- Ω model: BN 3569/60; Type ZUP, 75- Ω model: BN 3569/75.

Reflectometer Type ZDP \uparrow 300 MC to 4200 MC \downarrow

Frequency range 300 to 4200 mc. Reflection coefficient range 2 to 100%. 4 Dezifix B connectors. Dimensions: 165 x 95 x 40 mm.

- Reflectometer Type ZDP, 50- Ω model: Order Number BN 35691/50; Reflectometer Type ZDP, 60- Ω model: Order Number 35691/60.

SHF Directional Coupler Type ZCP \uparrow WR 90, 137, 159, 229 \downarrow

Coupling attenuation 20 db, directivity greater than 45 db, VSWR less than 1.02. For connection flanges see page 32.

- Waveguide cross-section WR 90: Order Number BN 35711/90. WR 137: Order Number BN 35711/137. WR 159: Order Number BN 35711/159. WR 229: Order Number BN 35711/229.

Material Characteristics Test Assembly \uparrow 80 to 7000 MC \downarrow

For determination of electromagnetic material characteristics of solids and liquids between -60 and +240°C.

- The complete test assembly comprises: 1 Base plate BN 39310 for Non-Slotted Line Type LMC or Slotted Line Type LMD; or BN 39311 for Slotted Line Type LMM. 1 Slotted Line Type LMD or LMM or 1 Non-Slotted Line Type LMC, depending on frequency. 1 Container BN 39319/50 or /60 for measurements on solids and liquids up to 7000 mc between -60 and +240°C, temperature maintained by circulating liquid. Consisting of: 3 coaxial specimen containers with temperature control jacket, usable lengths 3 cm, 10 cm, 20 cm, resp.; 2 coaxial temperature isolators and many accessories. 1 Calibrated Adjustable Short BN 39550/50 or /60 for 160 to 1000 mc; or BN 39591/50 or /60 for 800 to 7000 mc. 1 Extension Line BN 3972/50 or /60 for 80 to 160 mc.

SHF Squeeze Section LMHQ

The squeeze section is a simplified version of a slotted line. It is fitted with a fixed probe and is designed for measuring the energy reflected by a load, i.e. the standing-wave ratio resulting from it. Frequency range 8.2 to 12.4 kmc. Length 500 mm.

- Order Number BN 394311/90.

R&S MEASURING INSTRUMENTS FOR TRANSMISSION PARAMETERS

AF Transmission-Measuring Set Type SUT $\uparrow 200 \text{ CPS to } 20 \text{ KC} \downarrow$



A miniaturized transmission-measuring set. Battery-powered, transistorized. Level generator: 5 fixed frequencies, output voltage -80 to $+12 \text{ db}$ (-8 to $+1.4 \text{ N}$). Millivoltmeter: -80 to $+22 \text{ db}$ (-8 to $+2.4 \text{ N}$), 200 cps to 20 kc ; can be switched over to level generator or

receiving unit. Contains built-in standard attenuators for the level generator and receiving unit. R&S Standard Cabinet 14.
► Order Number, db model: BN 408741; neper model: BN 408742.

Square-Wave Analyzer Type PDF $\uparrow 10 \text{ CPS to } 10 \text{ MC} \downarrow$

Serves to determine attenuation constants in the range 20 cps to 10 mc and phase constants in the range 10 cps to 10 mc . Consists of the Square-Wave Generator CH 7, Twin Mixer CH 8, Twin Vacuum Tube Voltmeter CJ 13 and Phase Meter PZN. The Twin Mixer separates the sine-wave components of the input and output square-wave signals and converts them into an intermediate frequency of 30 to 40 kc . The Twin Vacuum Tube Voltmeter and the Phase Meter indicate the attenuation constant and phase constant, respectively. Possible applications: Measurements on amplifiers, cables, filters and aerials. Types CH 7, CH 8 and CJ 13 in Standard Cabinets 55, PZN in Standard Cabinet 56. ☞
► Order Number BN 1945.

Videoskop $\uparrow 100 \text{ KC to } 10 \text{ MC} \downarrow$ Type SWOF

The Videoskop Type SWOF is useful in television engineering. It comprises a sweep signal generator and a visual display unit with a screen size of $180 \times 240 \text{ mm}$. Both units are housed in the same cabinet so that frequency response display is easily possible without accessory units. Frequency markers are provided at 500-kc and 1-mc points. Cabinet dimensions: $540 \times 338 \times 575 \text{ mm}$. ☞
► Order Number BN 4241.

Side-Band Adapter for Videoskop Type SWOF. Permits the spectral energy distribution over the two side-bands of a television transmitter to be displayed directly and simultaneously on the Videoskop screen. This type of representation gives a rapid survey of the transmission characteristic as a function of modulation depth, and of the required suppression of the lower side-band at the transmitter. Dimensions: R&S Standard Cabinet 53. ☞
► Order Number BN 42415.

Polyskop $\uparrow 0.5 \text{ to } 400 \text{ MC} \downarrow$ Type SWOB

This instrument affords simultaneous display of two separate quantities as a function of frequency. The centre frequency can be adjusted between 0.5 and 400 mc while the sweep width is continuously variable between 1 and 100 mc . A few representative examples of possible applications are: Measurement on aerials, cables, filters, amplifiers, receivers and other two- and four-terminal networks. Whereas the point-by-point method requires much time in the alignment of multi-section filters, particularly because a change in the transmission characteristics affects also the input impedance, the Polyskop permits both quantities to be examined and thus provides for rapid alignment. The frequency range of the display section is 0.5 to 1000 mc . The voltage requirement for full-screen deflection is 50 mv , approx. The output voltage of the sweep signal generator is 0.5 v and the attenuator may be adjusted down to 70 db . Amplitude modulation up to 30% is possible in the range 50 cps to 20 kc . The cabinet dimensions are $540 \times 370 \times 575 \text{ mm}$. ☞

► Order Number for $50\text{-}\Omega$ model: BN 4244/50; for $60\text{-}\Omega$: BN 4244/60; for $75\text{-}\Omega$: BN 4244/75.



AF Transmission Measuring Set Type SUN $\uparrow 30 \text{ CPS to } 30 \text{ KC} \downarrow$

The AF Transmission Measuring Set Type SUN comprised of an RC oscillator (distortion less than 0.1% , S/N ratio better than 66 db) and of a millivoltmeter covering -80 to $+14 \text{ db}$. Another model, featuring a switching and filter panel, is tailored for use in broadcasting stations. It permits the harmonic distortion of four-terminal networks to be measured at 40 cps , 1 kc , 5 kc and 15 kc . A-c supply fluctuations of $+5\%$ to -15% do not affect the result. ☞

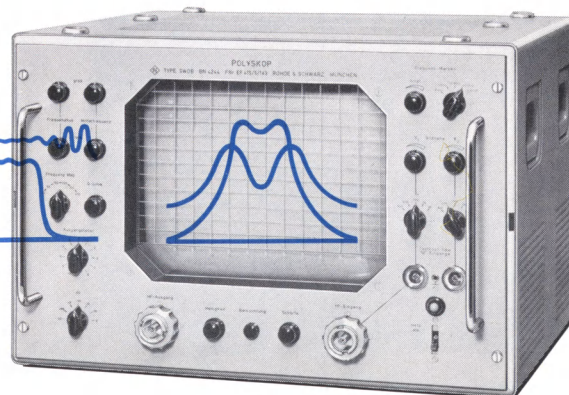
► AF Transmission-Measuring Set, R&S Standard Cabinet 57: Ord. No. BN 40872. AF Transmission-Measuring Set with Switching and Filter Panel, R&S Standard Cabinet 510: BN 408720.



Phase Meter Type PZN $\uparrow 10 \text{ CPS to } 500 \text{ KC} \downarrow$

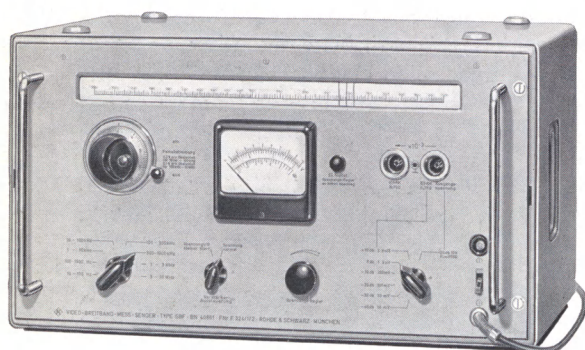
This direct indicating instrument measures phase angles between two continuous sine-wave signals. Measurement range: 0° to $45^\circ/90^\circ/180^\circ/360^\circ$ and 180° to $225^\circ/270^\circ/360^\circ$. Also, 180° may be added to each channel. Indications of $360^\circ - \varphi$ are provided for exact reading between 270° and 360° . The two signals under investigation may not only be distorted, but may also differ in waveform. A high input impedance of $1 \text{ M}\Omega$ in shunt with 30 pf provides minimum loading of the test item. The sensitivity of the two channels is switched separately between 0.1 to $25 \text{ v}_{\text{rms}}$ and 2.5 to $250 \text{ v}_{\text{rms}}$. Dimensions: R&S Standard Cabinet 56. ☞

► Order Number BN 1941.





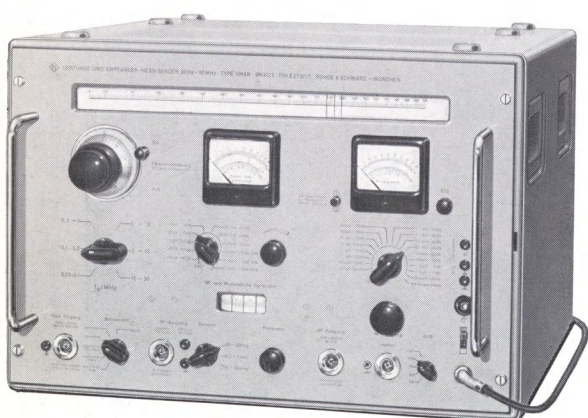
Beat-Frequency Oscillator 20 cps to 20 kc Type SIT BN 40341



Wide-Band Signal Generator 10 cps to 10 mc Type SBF BN 40861



Power Signal Generator 100 kc to 30 mc Type SMLR BN 41001



Power and Standard Signal Generator 30 cps to 31 mc Type SMAR BN 4123

R&S OSCILLATORS, SIGNAL GENERATOR

Frequency range	Type	Designation	Open-circ. V. Output power	Output impedance
2 cps—20 kc	SRN	RC Generator	10 μ v-3 v/0-30 v	600 Ω /0-25 k Ω
20 cps—20 kc	SIT	Beat-Frequency Oscillator	0.1 mv-2 v, 1 w into 150, 600 Ω , 7 k Ω	20, 60, 100, 200, 300, 600 Ω , 1 k Ω —
30 cps—300 kc	SRM	RC Generator	max. 1 v/max. 30 v	600 Ω /100 Ω
30 cps—30 kc	SMAR	Power and Standard Signal Generator	30 μ v-3 v/5 v	600 Ω /10 k Ω
30 kc—31 mc			0.03 μ v-10 v* into 60 Ω	50, 60, 75 Ω , 150, 600 Ω
10 cps—10 mc	SBF	Wide-Band Signal Generator	0.1 μ v-3 v/0-10 v	75 Ω /300 Ω
0.1—30 mc	SMLR	Power Signal Generator	1 μ v-3 v/max. 10 v	60 Ω —
1.5—6.5 mc	SMAF	Standard Signal Generator for AM and FM	0.05 μ v-50 mv*	60 Ω
10—100 mc			0.05 μ v-50 mv*	60 Ω
170—300 mc			0.05 μ v-50 mv*	60 Ω
10—230 mc	SMAF	Standard Signal Generator for AM and FM	0.05 μ v-50 mv*	60 Ω
4—300 mc	SMAF	Standard Signal Generator for AM, FM and Video	0.05 μ v-50 mv*	60 Ω
30—300 mc	SMLM	Power Signal Generator	max. 3 v*	60 Ω
170—620 mc	SDAF	UHF Standard Signal Generator for AM, FM and Video	1 μ v-450 mv	50 Ω
do.	do.	do.	do.	60 Ω
do.	do.	do.	do.	75 Ω
300—940 mc	SLSD	UHF Signal Generator	1 mv-1.8 v	50 Ω
do.	do.	do.	1 mv-2 v	60 Ω
do.	do.	do.	do.	75 Ω
0.3—1 kmc	SDR	UHF Signal Generator	1 μ v-3.5 v	50 Ω
do.	do.	do.	1 μ v-4 v	60 Ω
do.	do.	do.	do.	75 Ω
1—1.9 kmc	SCR	UHF Signal Generator	1 μ v-2.7 v, over 1.5 kmc max. 1.8 v	50 Ω
do.	do.	do.	1 μ v-3 v, over 1.5 kmc max. 2 v	60 Ω
1.7—2.7 kmc	SBR	UHF Signal Generator	1 μ v-2 v	50 Ω
do.	do.	do.	do.	60 Ω
0.275-2.75 kmc	SLRD	UHF Power Signal Generator	10 w-20 w-1 w	—
2.7—4.2 kmc	SAR	SHF Signal Generator	5 μ v-3.4 v, over 3.6 kmc max. 2 v	50 Ω
do.	do.	do.	as for 50 Ω	60 Ω
1.7—5 kmc	SMCB	SHF Signal Generator	3 mw-120 mw-20 mw	—
4.4—8.3 kmc	SMCC	SHF Signal Generator	80 mw-120 mw- 30 mw	—
8—11.4 kmc	SMCD	SHF Signal Generator	15 mw-70 mw-20 mw	—

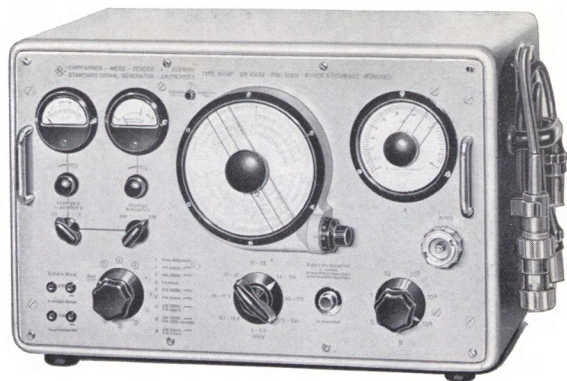
* Output voltage holds for match-termination unless specified for a particular termination.

** Squ

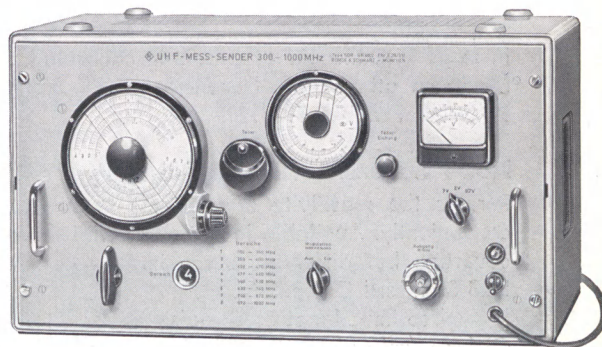
S, MODULATORS

Modulation Type	Depth/Swing	Modulation frequency Internal	Modulation frequency External	Miscellaneous (k = distortion)	R&S Standard Cabinet	Order Number
—	—	—	—	k < 1%	46	BN 4084
—	—	—	—	k < 2%	47	BN 40341
—	—	—	—	up to 100 kc k < 1% over 100 kc k < 2%	46	BN 4085
—	—	—	—	k < 0.2%	—	BN 4123 ★
AM 0-100%	—	0.03-15 kc	0.03-15 kc	crystal control of oscillator frequency	—	BN 40861
—	—	—	—	low distortion	—	BN 41001
AM 30%	1 kc	—	—	k < 2%	56	BN 41001
AM 0-90%	—	—	0.03-10 kc	—	—	—
AM 0-80%	1 kc	—	—	—	—	—
FM 0-20 kc	1 kc	—	—	—	—	—
AM 0-80%	1 kc	0.03-100 kc	0.03-15 kc	AM and/or FM	58	BN 41407
FM 0-80 kc	1 kc	0.03-100 kc	0.03-15 kc	AM and/or FM	—	—
AM 0-80%	1 kc	0.03-100 kc	0.03-15 kc	AM and/or FM	—	—
FM 0-80 kc	1 kc	0.03-100 kc	0.03-15 kc	AM and/or FM	—	—
AM 0-80%	1 kc	0.03-100 kc	0.03-20 kc	AM and/or FM	58	BN 41401
FM 0-100 kc	1 kc	0.03-100 kc	0.03-20 kc	AM and/or FM	58	BN 41404
AM 0-80%	1 kc	0.03-100 kc	0.03-20 kc	Video: Ext. 0-6.5 mc AM and/or FM	58	BN 41404
FM 0-100 kc	1 kc	0.03-100 kc	0.03-20 kc	—	—	—
AM 80%	1 kc	—	—	—	—	—
AM 0-80%	—	—	0.03-200 kc	Output atten. 60 db	46	BN 4105
AM 0-90%	1 kc (60%)	3 cps-6.5 mc	0.03-20 kc	AM and/or FM	581	BN 41023/2/50
FM 0-100 kc	1 kc	0.03-20 kc	—	—	—	—
as for 50 Ω	as for 50 Ω	as for 50 Ω	—	do.	do.	BN 41023/2/60
as for 50 Ω	as for 50 Ω	as for 50 Ω	—	do.	do.	BN 41023/2/75
AM 100%	1 kc**	—	—	Triode oscillator with cap. tuning	56	BN 41003/50
do.	do.	—	—	do.	do.	BN 41003/60
do.	do.	—	—	do.	do.	BN 41003/75
AM 100%	1 kc**	—	—	do.	58	BN 41022/50
do.	do.	—	—	do.	do.	BN 41022/60
do.	do.	—	—	do.	do.	BN 41022/75
AM 100%	1 kc**	—	—	do.	58	BN 41026/50
do.	do.	—	—	do.	do.	BN 41026/60
AM 100%	1 kc**	—	—	do.	58	BN 41027/2/50
do.	do.	—	—	do.	do.	BN 41027/2/60
AM 100%	1 kc**	—	—	Output atten. 80 db	—	BN 41004
AM 100%	1 kc**	—	—	Triode oscillator with cap. tuning	57	BN 41029/50
do.	do.	—	—	do.	do.	BN 41029/60
AM 100%	—	over 30 cps**	15 cps-30 mc	Klystron, atten. 120 db	57	BN 41042
FM 0-12 mc	—	15 cps-30 mc	—	—	—	—
AM 100%	—	over 30 cps**	15 cps-30 mc	Klystron, atten. 120 db	57	BN 41043
FM 0-12 mc	—	15 cps-30 mc	—	—	—	—
AM 100%	—	over 30 cps**	15 cps-30 mc	Klystron, atten. 120 db	57	BN 41044
FM 0-12 mc	—	15 cps-30 mc	—	—	—	—

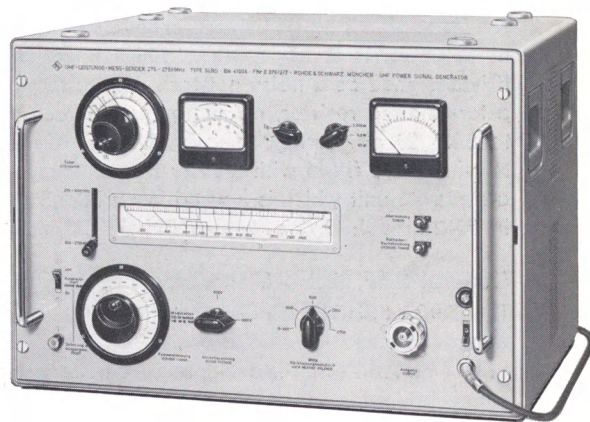
re-wave voltage



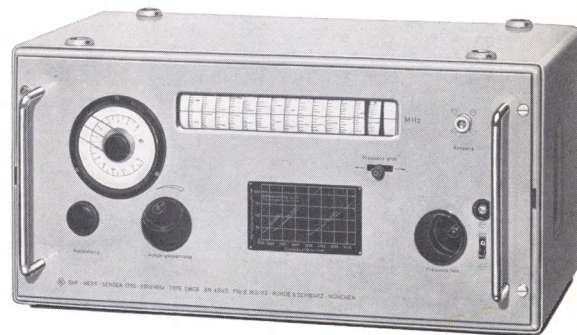
Standard Signal Generator for AM, FM and Video 4 mc to 300 mc
Type SMAF BN 41404



UHF Signal Generator 300 mc to 1 kmc Type SDR BN 41022/50



UHF Power Signal Generator 275 mc to 2.75 kmc Type SLRD
BN 41004



SHF Signal Generator 1.7 kmc to 5 kmc Type SMCB BN 41042

**UHF AM Modulator Type MAD**

The Type MAD is designed for amplitude modulating signal generators in the UHF range. With this instrument, signal generators may be modulated with sine waves, square waves, pulses, etc., at frequencies from 0 to 20 mc in the range 170 to 1300 mc. Max. carrier voltage 2 v open circuit. Max. modulation voltage 1.5 v_{pp} . Dimensions: R&S Standard Cabinet 35. cm

► For 50 Ω , BN 4191/50; for 60 Ω , BN 4191/60.

SHF Modulator Type MAC

The SHF Modulator, which has the waveguide cross-section WR 90, provides for amplitude modulation in the SHF range. The modulation depth is adjustable between 0 and 90%. Incidental frequency modulation cannot occur. The frequency range is 8500 to 9600 mc, the modulation-frequency range 0 to 5 kc, the maximum modulation power is 1 w. Length 250 mm. cm

► Order Number BN 419511/90.

Noise Generator \uparrow 30 CPS to 6 MC \downarrow Type SUF

This instrument is a versatile noise source for audio, carrier- and video-frequency engineering. It delivers a noise spectrum in the ranges 30 cps to 20 kc, 30 cps to 600 kc and 30 cps to 6 mc. The output voltage is max. 1 v_{rms} into 75 Ω and is continuously adjustable in steps with the aid of a built-in calibrated attenuator of 100 db maximum attenuation. Dimensions: R&S Standard Cabinet 56. cm

► Order Number BN 4150.

Noise Generator \uparrow 3 to 1000 MC \downarrow Type SKTU

Permits the sensitivity of receivers to be measured rapidly and conveniently. Available in 3 models with the same noise spectrum coverage but different source impedances. VSWR less than 1.1. R&S Standard Cabinet 45. cm

► Source impedance 50 Ω , noise power 0 to 32 kT_0 or 0 to 15 db: Order Number BN 4151/2/50. Source impedance 60 Ω , noise power 0 to 40 kT_0 or 0 to 16 db: BN 4151/2/60. Source impedance 75 Ω , noise power 0 to 32 kT_0 or 0 to 15 db: BN 4151/2/75.

Coaxial UHF Noise Generator \uparrow 475 to 3000 MC \downarrow Type SKTD ★

The Coaxial UHF Noise Generator covers 475 to 3000 mc. The available noise power is $69 kT_0 \pm 3 kT_0$, which is equal to $18.4 \text{ db} \pm 0.2 \text{ db}$. It is designed as a noisy network. In two-terminal connection using a terminating resistor, noise figures between 1 and 100 kT_0 , equal to 0 to 20 db, can be measured. Dimensions: 700 x 85 mm. Both terminals are fitted with Dezifix B connectors. The power supply is a separate unit which is housed in an R&S Standard Cabinet 35. cm

► 50- Ω model: Order Number BN 4152/50; 60- Ω model: BN 4152/60.

Coaxial SHF Noise Generator \uparrow 1.5 to 6 KMC \downarrow Type SKTC ★

The Coaxial SHF Noise Generator covers the frequency range 1.5 to 6 kmc. The available noise power is $69 kT_0 \pm 3 kT_0$, which is the equivalent of $18.4 \text{ db} \pm 0.2 \text{ db}$. It is designed as a noisy network. In two-terminal connection using a terminating resistor, noise figures from 1 to 100 kT_0 , equal to 0 to 20 db, can be measured. Dimensions: 700 x 85 mm. Both terminals are fitted with Dezifix B connectors. The power supply is a separate unit, which is housed in an R&S Standard Cabinet 35. cm

► 50- Ω model: Order Number BN 4153/50; 60- Ω model: BN 4153/60.

Synchronizing Pulse Generator Type SIF

This instrument is designed as sync pulse generator for television transmitter stations and for laboratory purposes. It can be used to advantage, for example, for supplying studios, transmitter test equipment, relay stations, industrial television equipment, etc. with the pulses required for synchronization, blanking and control of television cameras. The Synchronizing Pulse Generator complies with the CCIR standard. The output voltage of the CCIR signals of 625-line standard is 4 v into 75 Ω . Special models for other line standards upon request. R&S Standard Cabinet 59. cm

► Order Number BN 42263.

**Precision Blanking and Sync Signal Mixer Type MSF**

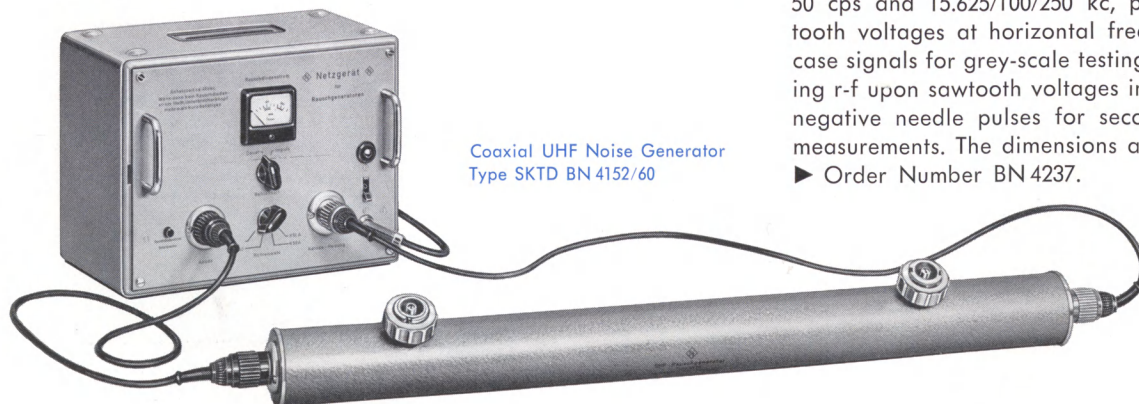
This instrument combines the pulses delivered by a picture signal generator and the blanking and synchronizing pulses obtained from a sync pulse generator into a standard composite signal. It meets much higher requirements than an ordinary studio equipment since it is designed as a measuring instrument. The signal mixer is suitable above all for use in television transmitter test assemblies in conjunction with the Videoskop, the test pattern generator, the wide-band signal generator, etc. Dimensions 540 x 240 x 525 mm. cm

► Order Number BN 4194.

Test Pattern Generator Type SSF

This instrument produces the video signals required for testing television communication systems: square-waves at 50 cps and 15.625/100/250 kc, pushbutton-selected; sawtooth voltages at horizontal frequency (15.625 kc); staircase signals for grey-scale testing; facility for superimposing r-f upon sawtooth voltages in linearity measurements; negative needle pulses for second-reflection component measurements. The dimensions are 540 x 301 x 525 mm. cm

► Order Number BN 4237.



Coaxial UHF Noise Generator
Type SKTD BN 4152/60

Picture Pattern Generator Type STF

The testing of all parts of a television broadcasting system, such as studio equipment, transmission systems, cables, transmitters and receivers, requires methods which approach the actual operating conditions as closely as possible. The Picture Pattern Generator Type STF produces, by purely electrical means, a complete composite video signal complying with the CCIR standard. The internal impedances of the output stages have a value of 75 Ω . All switching operations are controlled by push-buttons. Dimensions of Type STF: R&S Standard Cabinet 510. ⚡
► Order Number BN 4236.



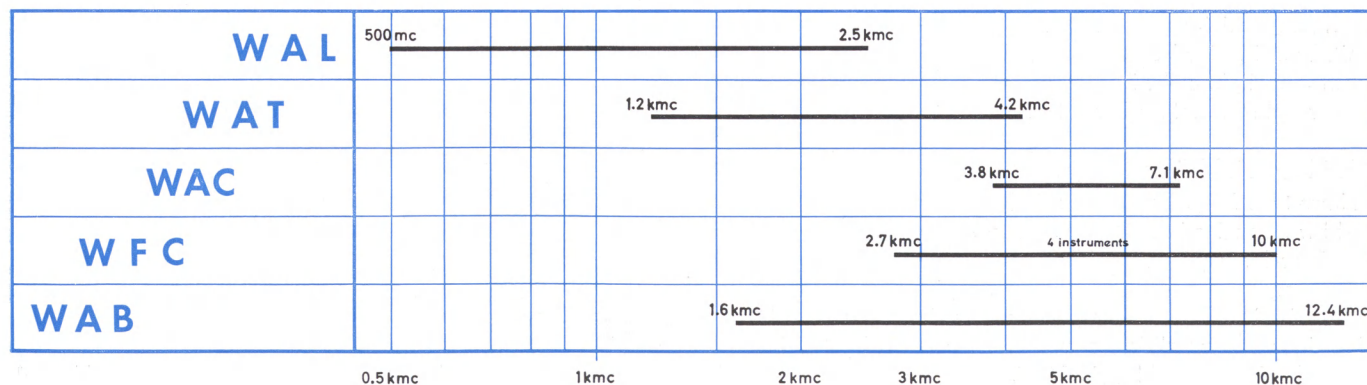
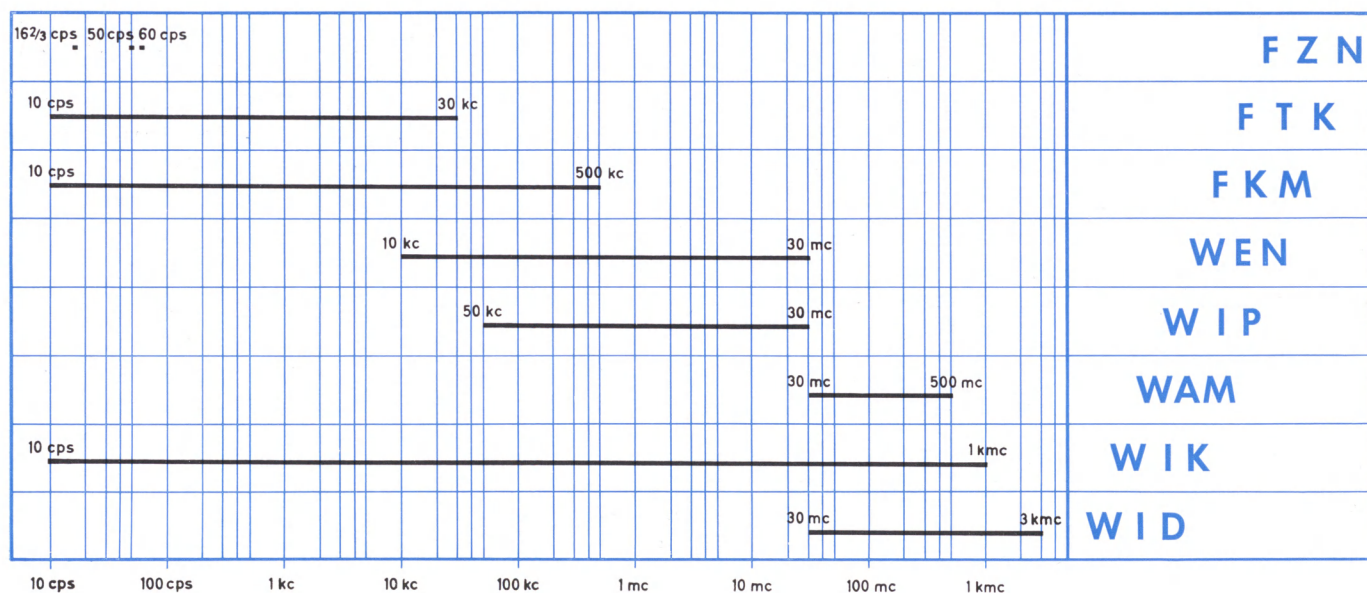
Sweep Signal Generator $\uparrow 50 \text{ KC to } 12 \text{ MC} \downarrow$ Type SWH

Especially designed for the investigation of 2- and 4-terminal networks by means of an oscilloscope. Great versatility. Distinguishing features are: Sweep width ± 0.05 to 5% of the centre frequency; sweep frequency about 20 cps (linear sawtooth); crystal-controlled marker spectrum with 10-kc, 50-kc or 100-kc marker spacing; double frequency markers produced by an external frequency; level reference line adjustable in 13 steps; output voltage 50 μV to 2 V; source impedance 60 Ω . R&S Standard Cabinet 57. ⚡
► Order Number BN 4242/2.

Sweep Signal Generator $\uparrow 5 \text{ to } 225 \text{ MC} \downarrow$ Type SWF

Used over the range 5 to 225 mc in conjunction with an oscilloscope for visually checking the response characteristics of 4-terminal networks, such as filters and amplifiers, with bandwidths up to 24 mc. The a-c supply frequency serves as sweep frequency. Output into 60 Ω adjustable between 0.1 and 100 mv. Marker spectrum with switch-selected marker spacing of 1 mc or 10 mc. Dimensions: R&S Standard Cabinet 57. ⚡
► Order Number BN 4243/2.

R&S FREQUENCY METERS



Resonance Frequency Meters

just like multimeters, belong to the standard instrumentation of radio-frequency laboratories. They include a tunable calibrated resonance circuit which by means of a resonance indicator is set to the unknown frequency. Thus, ease of operation and unambiguous test results are always ensured.

Frequency Meter \uparrow 10 KC to 30 MC \downarrow Type WEN

The Frequency Meter Type WEN combines simplicity and reliability with high sensitivity. The measurement range 10 kc to 30 mc is covered in 7 bands with an accuracy of $\pm 0.5\%$. Sensitivity 5 mv to 20 v, adjustable. Output provided for demodulated HF signal. R&S Standard Cabinet 35. ⚡
► Order Number BN 435.

Resonance Frequency Meter \uparrow 30 to 500 MC \downarrow Type WAM

Covers the frequency range 30 to 500 mc in 8 sub-ranges. Accuracy $\pm 0.5\%$, sensitivity 200 mv at full-scale deflection of resonance indicator. Output for demodulated radio frequency. Operates from transistorized amplifier powered from 4 penlight cells. Dimensions: R&S Standard Cabinet 35.
► Order Number BN 4312/2.



The Frequency Meters Types WEN, WAM, WAL, WAT, WAB belong to one family of instruments. They all have the same small dimensions, 286 x 227 x 226 mm, and together cover a frequency range of 10 kc to 12,400 mc.

UHF Resonance Freq. Meter \uparrow 0.47 to 2.5 KMC \downarrow Type WAL

Covers a frequency range from 470 to 2500 mc with an accuracy of ± 0.08 to 0.15% depending on frequency; sensitivity approx. 0.15 v at f.s.d. Provided with transmission type connections with negligible insertion loss. Output for demodulated UHF signal. Transistorized amplifier for direct current, powered from 4 penlight cells. R&S Standard Cabinet 35.

► For 50 Ω : Ord. No. BN 4321/2/50. For 60 Ω : BN 4321/2/60.

SHF Resonance Freq. Meter \uparrow 1.2 to 4.2 KMC \downarrow Type WAT

Frequency range 1200 to 4200 mc in 2 bands, accuracy $\pm 0.1\%$, sensitivity approx. 0.1 v at f.s.d. Transmission type unit. Transistorized amplifier for direct current, operating from 4 penlight cells. R&S Standard Cabinet 35.

► For 50 Ω : Order Number BN 4322/50. For 60 Ω : BN 4322/60.

SHF Free-Field Frequency Meter Type WAC

A horn type frequency meter suitable for determining free-field frequencies in the range 3.8 to 7.1 kmc. It is used to check radar equipment, (directional) radio transmitters, diathermy generators, etc. The sensitivity is 10 μ v for full-scale deflection of the panel meter. Accuracy $\pm 0.1\%$. Transistorized amplifier, powered from 4 penlight cells.

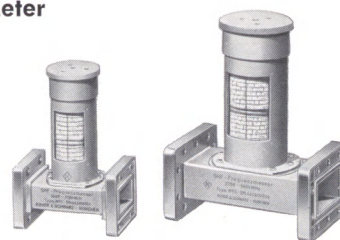
► Order Number BN 432611/159.

Transmission Type Frequency Meter

\uparrow 2.7 to 10 KMC \downarrow Type WFC

It has been designed for connection into a transmission line and can be used both as a precision frequency meter (accuracy 0.1%) and as a filter with a Q of about 700. When connected to a Tee it can be employed as a reaction type frequency meter; in conjunction with a detector mount, it is usable as an absorption frequency meter.

► Range 2.7 to 5.2 kmc, WR 229: Order Number BN 432811/229.



Range 3.8 to 7.1 kmc, WR 159: BN 432811/159. Range 5.0 to 9.0 kmc, WR 137: BN 432811/137. Range 8.2 to 10.0 kmc, WR 90: BN 432811/90.

Coax. SHF Wide-Band Frequency Meter \uparrow 1.6 to 5.4 KMC \downarrow WAB

This wide-band frequency meter is coupled to a transmission line from which it absorbs a small portion of the energy when tuned to resonance. Tuned to $\lambda/4$ it offers direct measurement of frequencies between 1600 and 5400 mc, tuned to $3/4 \lambda$ it gives direct measurement between 5400 and 12,400 mc. R&S Standard Cabinet 35.

► Order Number BN 4324.

Frequency Indicators

just like voltage indicators, provide direct and continuous frequency indication on a meter scale. This permits frequency variations to be observed conveniently. The measured value is largely independent of the amplitude and waveform of the input voltage. They are used as self-contained frequency meters or, in conjunction with heterodyne frequency meters and frequency measuring systems of extreme accuracy, to indicate the difference between the known and an unknown frequency.

Frequency Indicator

\uparrow 10 CPS to 30 KC \downarrow Type FTK

Easy-to-operate frequency meter with 6 sub-ranges. Input voltages permissible between 1 and 250 v. Accuracy $\pm 2\%$ of f.s.d. Indication of fundamental wave ensured even with distorted waveforms as long as dips on a half wave do not go below 0.5 v. Connection of a recorder, of a photoelectric or contact-operated pick-up for measuring the number of revolutions or strokes is possible. R&S Standard Cabinet 14. ⚡



► FTK Order Number BN 4700.

Frequency Indicator

\uparrow 10 CPS to 500 KC \downarrow Type FKM

Provides direct indication from 10 cps to 500 kc in 9 ranges with an accuracy of $\pm 1.5\%$ of f.s.d. Internal mixers permit measurement of the difference between unknown frequencies in the range 5 kc to 1000 mc and a reference frequency which need not be higher than 30 mc since its harmonics up to 1000 mc are produced in the Type FKM. Beat-note indication allows adjustment to the reference frequency. A "frequency magnifier" indicates $\pm 3\%$ of the measurement range on a separate panel meter, at $3/4$ of f.s.d. For example, the centre frequency of frequency-modulated transmitters is thus measurable to an accuracy of 0.1% of the frequency swing. A direct current of 0 to 10 ma proportional to the frequency is available for frequency recording. R&S Standard Cabinet 561. ⚡

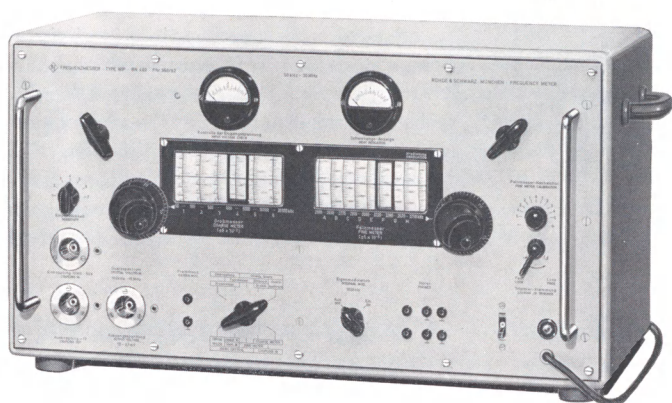
► FKM Order Number BN 47051.

Heterodyne Frequency Meters

A heterodyne frequency meter is comprised of a highly stable reference oscillator, a mixer and an indicator for difference frequencies. An unknown frequency is measured by heterodyning it with a reference frequency or one of its harmonics which is then adjusted for a measurable or audible difference frequency. A heterodyne frequency meter can also be used as a precision-calibrated reference oscillator for investigations on highly selective passive networks such as filters or receivers.

Frequency Meter $\uparrow 50 \text{ KC to } 30 \text{ MC} \downarrow$ Type WIP

Covers the frequency range 50 kc to 30 mc with an accuracy of 5 parts in 10^5 . Frequency check is possible against 100-kc crystal stage. Sensitivity 10 mv. The frequencies of 50 kc to 30 mc, the crystal frequency and its harmonics up to 15 mc, all derivable from the set, can be internally modulated by 1000 cps or from an external source. Operation is simple and no consideration need be given to determining the harmonic number. Particularly suitable for measurement of small frequency increments. Dimensions: 695 x 350 x 360 mm. RF
 ► Order Number BN 440.

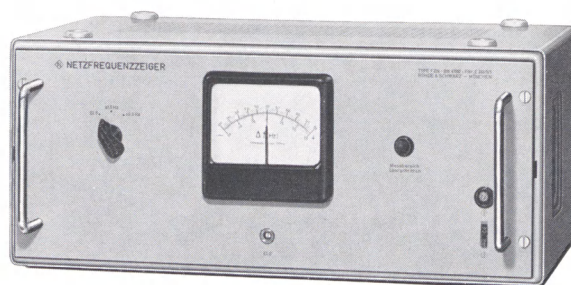


VHF-UHF Frequency Meter $\uparrow 30 \text{ to } 3000 \text{ MC} \downarrow$ Type WID

Covering the frequency range 30 to 3000 mc, it is the companion set to our Frequency Meter Type WIP. Accuracy 3 parts in 10^5 . Sensitivity 2 mv. In fundamental-frequency operation, from 30 to 300 mc, there is no ambiguity in the measurement. Measurements over 300 mc up to 3000 mc are made against harmonics. The dimensions of the VHF-UHF Frequency Meter Type WID are 695 x 350 x 350 mm. RF
 ► Order Number BN 442.

Frequency Meter $\uparrow 10 \text{ CPS to } 1000 \text{ MC} \downarrow$ Type WIK

The Frequency Meter Type WIK is a compact instrument comprised of a crystal-controlled frequency standard driving a signal generator, a mixer and a frequency indicator. The wide range of 10 cps to 1000 mc permits a great number of measurement problems to be solved. The frequency stability is 1 part in 10^7 /day plus $\pm 2\%$ up to 30 kc, ± 50 cps up to 30 mc and ± 1650 cps at 1000 mc. The instrument produces a reference frequency, variable between 50 cps and 30 mc, which is mixed with the unknown frequency, and then indicates the difference frequency. Over 30 mc, harmonics of the reference frequency are used, the determination of the harmonic number being very simple. The voltage indicated on the meter is available for frequency recording. Frequencies of remote amplitude and frequency modulated transmitters are measurable in conjunction with a suitable receiver. Dimensions: R&S Standard Cabinet 5101. RF
 ► Order Number BN 4421.



Mains Frequency Indicator Type FZN $\uparrow 16\frac{2}{3}, 50, 60 \text{ CPS} \downarrow$

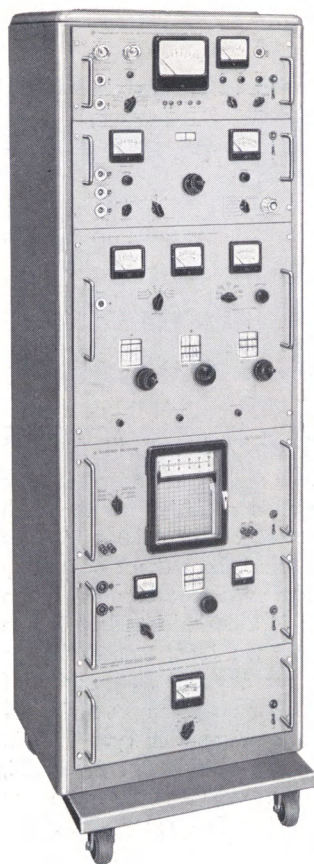
This set is for the measurement and recording of the a-c supply frequency. Use of crystals provides for the high accuracy of ± 2.5 millicycles at 50 cps or ± 3.0 millicycles at 60 cps, even over a long period. Zero check possibility by built-in reference crystal, the wide measurement range and the output current which is load-independent in the range 0 to 10 k Ω make the set the ideal transducer for frequency control. Available for nominal frequencies of 50 cps and 60 cps. Sets for other supply frequencies on request. Using the Differentiating Amplifier Type FZD in conjunction with the Mains Frequency Indicator Type FZN, it is possible to obtain the first derivative of the frequency with respect to time. Use of the Frequency Converter $16\frac{2}{3} \text{ cps} \rightarrow 50 \text{ cps}$ makes the Type FZN additionally suitable for railway power systems having a nominal frequency of $16\frac{2}{3} \text{ cps}$. Dimensions: R&S Standard Cabinet 56. RF
 ► For 50 cps: Order Number BN 47092. For 60 cps: Order Number BN 47092/60. Frequency Converter $16\frac{2}{3} \text{ cps} \rightarrow 50 \text{ cps}$: Order Number BN 470921.

Overspeed Monitor Type FDW

In conjunction with a tacho-generator, the Overspeed Monitor Type FDW is employed to prevent overspeed of steam turbines. Sudden changes in speed, such as due to load reduction, cause the monitor to close a contact. Thus, the changed operating conditions can be met. Response values can be selected from 4 to 10% of the speed rating per second. The response time is less than 50 millisecc. The Dimensions of Type FDW are 411 x 236 x 200 mm.
 ► Order Number BN 47081.



R&S STANDARD FREQUENCY EQUIPMENT: SYNTHESIZERS, FREQUENCY



Decade Frequency Measuring System XZA BN 444044, expanded by a Frequency Standard XSB, a Recorder XMA and a Times-Ten Frequency Multiplier XVD.

Decade Frequency Measuring System Type XZA $\uparrow 10$ CPS to 1000 MC (10000 MC) \downarrow

This system contains all the units necessary for precision frequency measurement. The units are housed in a casted cabinet rack so that, in spite of its weight, the entire system can be easily moved from place to place. Measurements are based on the heterodyne method, i.e. an accurately-known reference frequency or its harmonics are heterodyned with the unknown frequency and adjusted for zero-beat with the aid of a difference frequency indicator. The reference frequency is obtained from the Frequency Synthesizer Type XUA (see below). Three dials permit varying its output frequency between 30 cps and 30 mc. The first and second dials lock with crystal accuracy in steps of 100 kc and 1 kc, resp.; the third dial is continuously adjustable over a range of 1 kc (accuracy 0.5 cps). The built-in crystal oscillator has a daily stability of about 2 parts in 10^8 . The frequency accuracy can be further improved by driving the synthesizer by an external 100-kc frequency of higher stability. The Frequency Standard Type XSB (see p. 23) with its stability of 2 parts in 10^9 suggests itself for this purpose. The built-in Frequency Indicator Type FKM (see p. 20) mixes the frequencies to be compared and indicates the difference frequencies from 10 cps to 500 kc. Thus, frequencies up to 1000 mc can be measured. The reference frequency range can be extended up to 300 mc by the Times-Ten Frequency Multiplier Type XVD (see p. 7). By that, frequencies up to 10 kmc are measurable. The Recorder Type XMA, which can likewise be incorporated, records the measured frequencies as a function of time. Dimensions of Type XZA: 600 x 1638 (1808) x 640 mm. \ddagger

► Order Numbers: Type XZA for use up to 1000 mc, BN 444043; with space provided for frequency extension up to 10,000 mc, BN 444044. Recorder Type XMA, BN 444512.

Decade Frequency Measuring System Type XZB $\uparrow 10$ CPS to 1000 MC \downarrow

This system is a bench-type version of the decade frequency measuring system described above. The frequency indicator is of a somewhat simpler design. The Type XZB measures frequencies between 10 cps and 1000 mc with an accuracy of about 2 parts in $10^8 \pm 1.5$ cps up to 30 mc and ± 17.5 cps at 1000 mc. As in the case of the Type XZA, the accuracy can be improved to 2 parts in 10^9 by driving it from the Frequency Standard Type XSB (see page 23). The Times-Ten Frequency Multiplier Type XVD (see page 7) permits extending the frequency range to a few kilomegacycles. The Recorder Type ZSG (see page 9) can be used for recording the measured values. Dimensions of the Decade Frequency Measuring System Type XZB: 600 x 780 x 640 mm. \ddagger

► Order Number BN 444045.

Frequency Synthesizer Type XUA

\diamond Frequency range 30 cps to 30 mc \diamond

This instrument permits any frequency between 30 cps and 30 mc to be set on 3 drum dials each with a scale 1.2 metres in length. Crystal accuracy is obtained by lock-tuning which occurs at 100 kc and 1 kc intervals. Continuous tuning between lock-tune intervals is possible to better than 0.5 cps. The output frequency is the sum of the three dial settings. A built-in crystal stage (stability about 2 parts in 10^8) is used as frequency standard. The instrument can also be driven by an external 100-kc frequency of higher stability. The output voltage is sinusoidal, free from spurious frequencies and adjustable between 0.1 mv and 1 v (source impedance 60 Ω). The possibility of very accurate frequency adjustment makes the instrument ideal for stability measurements and for calibration of any active and passive instruments calibrated in terms of frequency. Precision frequency measurement is its most important application. It forms part of the Frequency Measuring Systems Types XZA and XZB. Dimensions: 600 x 780 x 640 mm. \ddagger

► Order Number BN 444463.

Frequency Synthesizer Type XUB

\diamond Frequency range 0.0005 cps to 10 kc \diamond

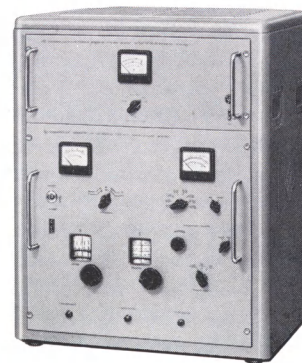
This instrument resembles the Frequency Synthesizer Type XUA in its electrical and mechanical design. The output frequency ranges 0 to 100, 0 to 1000 and 0 to 10,000 cps are switch-selected. Crystal accuracy is obtained by lock-tuning which occurs at 1, 10 and 100 cps intervals. Continuous tuning between lock-tune intervals is possible to respectively better than 0.0005, 0.005 and 0.05 cps. The output voltage is sinusoidal, free from spurious frequencies and adjustable between 0.3 mv and 3 v (source impedance 600 Ω). This VLF precision synthesizer can be employed, e.g. for calibrating direct-reading frequency meters, for studying mechanical resonators (tuning forks, resonance relays) and for measurements on low-frequency crystals. It is also used to advantage in control engineering for investigating response. In addition, it can be connected to the Frequency Synthesizer Type XUA. Lock-tuning, occurring every 10 cps, ensures that the output frequency of this combination has crystal accuracy from 30 cps to 30 mc. Continuous tuning between lock-tune intervals is possible to better than 0.005 cps. The dimensions of the Frequency Synthesizer Type XUB are 600 x 780 x 640 mm. \ddagger

► Order Number BN 444465.

Midget Crystal Clock Type XSZ

This clock is primarily designed for use as frequency standard and delivers the frequencies 50 cps, 100 cps, 1 kc, 10 kc and 100 kc which are synchronized with each other. Frequency variations within 24 hours are less than 1 part in 10^7 . The mean daily frequency drift after continuous service for 100 days is less than 5 parts in 10^8 . The built-in synchronous clock and its second contact, which is connected to a front-panel socket, can be used for time measurements and control purposes. R&S Std. Cab. 57. \ddagger

► Order Number BN 444211.



Frequency Synthesizer XUB. The Frequency Synthesizer XUA looks the same except for the dials.

MEASURING AND STANDARD TIME SYSTEMS

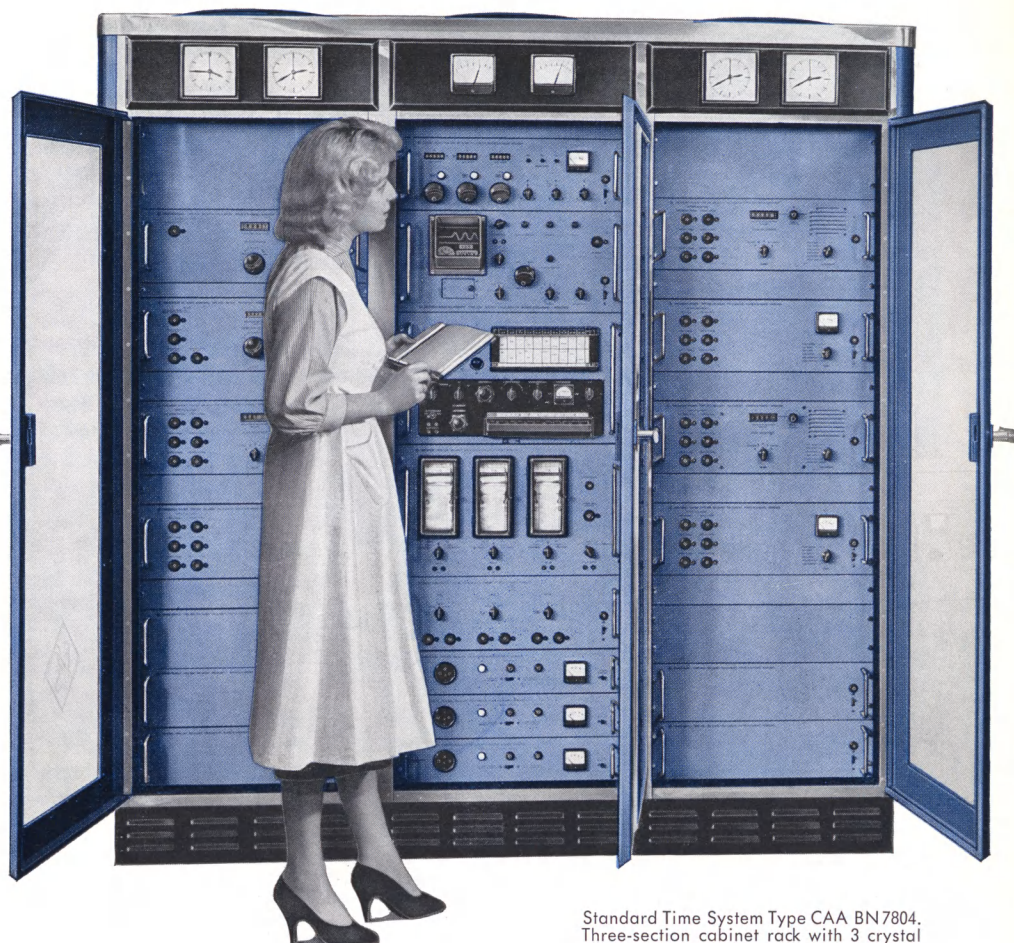
Decade Synthesizer and Exciter XUD

◇ Frequency range 100 kc to 30 mc ◇

Output frequency in decade steps; output adjustable up to 1 w into 60 Ω . Two different models have been designed: one without modulation capability and with 7 decades and minimum frequency increments of 1 cps; the other with modulation capability and 6 decades with minimum frequency increments of 10 cps. Both models are available with an internal crystal oscillator (stability about 2 parts in 10^7 /day) or with provision for external control. This instrument is usable, e.g. as signal generator of very high frequency stability, as reference frequency source for heterodyne frequency measurements and as exciter for long-, medium- and short-wave transmitters. ¶

► Models with 1-cps frequency increments, without modulation, with external control by 10 kc, 100 kc, 1 mc: Order Number BN 444472; do. with external control by 100 kc: BN 444473; do. with internal crystal control: BN 444474.

► Models with 10-cps frequency increments, AM and FM modulation, external control by 10 kc, 100 kc, 1 mc: Order Number BN 444475; do. with external control by 100 kc: BN 444476; do. with internal crystal control: BN 444477.



Standard Time System Type CAA BN7804. Three-section cabinet rack with 3 crystal clocks and measuring equipment. Cabinet rack with 3 frequency standards not shown.

Frequency Standard Type XSA $\pm 10^{-9}$

This precision frequency standard delivers the frequencies of 1 mc and 100 kc at an output of 1 volt. A special spring-suspended double-chamber oven and careful stabilization of all operating voltages ensure freedom from external influences so that the stability of the output frequencies is determined only by crystal aging. For this reason the daily drift after 100 days of service is less than 1 part in 10^9 and progressively decreases with service time. A value of 1 part in 10^{10} per day is obtainable. Incremental frequency tuning is possible by remote control, the total amount being read directly in terms of parts in 10^{10} on a mechanical register. This is of particular advantage when the instrument is used in standard time systems (see specifications at the right and on page 24). Remote control is effected manually via a synchro-system. In addition, the remote control can be made automatically by a frequency controller. In conjunction with auxiliary units this feature enables automatic frequency correction, for example against atomic or molecular frequency standards. Spurious modulation of the output voltages is down more than 60 db. Ambient temperature fluctuations are permissible between 0° and 40° C. R&S Standard Cabinet 56. ¶

► Order Number BN 444111.

Frequency Standard Type XSB $\pm 10^{-9}$

This instrument delivers the frequencies of 1 mc and 100 kc which are synchronized with each other. The output voltage is about 1 v, the source impedance 60 Ω . Due to careful design of the crystal stage and the oven, frequency changes within 24 hours are less than 1 part in 10^9 if the temperature varies between +15° and +35° C, the a-c supply voltage fluctuates by $\pm 5\%$ and the a-c supply frequency remains between 47 and 63 cps. The stability increases with the time of unintermittent service, as it does in all crystal-controlled precision oscillators. The mean daily frequency drift is less than 2 parts in 10^9 after 100 days of service and may decrease to a few parts in 10^{10} after a longer service time. A scale about 1 m in length has marks at frequency intervals of 1 part in 10^9 , settings in between being possible. Spurious modulation is down more than 80 db; this instrument is therefore particularly suitable for driving the Decade Frequency Measuring Systems Types XZA and XZB and the Frequency Synthesizer Type XUA. Dimensions of the Type XSB: R&S Standard Cabinet 57. ¶

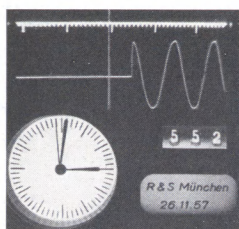
► Order Number BN 444112.

Standard Time Systems Type CAA

Standard time systems are designed for dividing the fundamental unit of astronomical time, i.e. the mean duration of one rotation of the earth about its axis, into smaller units of time. Because of their high accuracy crystal clocks are best suited for this purpose. Since these systems are also capable of delivering standard frequencies they can be used as primary frequency standards for calibration and control of frequency measuring equipment and for synchronous drive of clocks and astronomical instruments. The Standard Time Systems Type CAA are combinations of different instruments which can also be set up outside the standard time system and used as self-contained units. Combinations other than those described on page 24 can be made up. This permits setup of systems which are capable of satisfying the requirements of a special measuring problem. All models of the Standard Time System Type CAA are accommodated in cabinet racks complying with the German standard DIN 41491. This type of construction provides for high mechanical stability, ease of access and operating convenience.



R&S STANDARD FREQUENCY EQUIPMENT/continued



Detail from picture on p. 23. Read-out system of the Time Signal Oscillograph Type CAO, displaying the time signal from the Frequency Divider Type XVC. Shown is start of time signal: seconds indicated by clock, milliseconds by mechanical register, fine reading by electronically generated time markers. Note vertical rise.

Standard Time System Type CAA BN 78011

Uses the Frequency Standard Type XSA (see p. 22) as crystal stage. Frequency division by electronic means. Frequency Divider Type XVB delivers 100-kc, 10-kc, 1-kc signals in both sine-wave and pulse form. Harmonics of the pulse voltage suitable for calibration of receivers up to about 120 mc. Frequency Divider Type XVC delivers 100-cps, 50-cps, 10-cps and 1-cps signals; in addition, it supplies a 1000-cps modulated seconds signal of 0.1 sec duration, and 0.5 cps square-wave pulses for driving a jumping-second-hand clock. At a-c supply failure, the Mains Monitor Type XNY switches the system over to the Emergency Power Converter Type XNZ fed from a 24-v battery. Cabinet rack 689 x 2012 x 612 mm. ⚡
 ▶ Order Number BN 78011.

Standard Time System Type CAA BN 78012

In addition to the instruments making up the system BN 78011, it contains an All-Wave Receiver Type UE 12 and a Time-Signal Oscillograph Type CAO for checking the system against radio time signals transmitted by other stations. The Time Signal Oscillograph has another 9 test inputs which, together with an input selector, provide for successive comparison of 9 external time signals with the time signal from the system. The Programme Contactor Type CAZ which is also included permits combining a maximum of 6 independent 24-hour programmes from the time signals and the frequencies obtained from the Frequency Divider Type XVC. The dimensions of the cabinet rack of the Standard Time System Type CAA BN 78012 are 689 x 2012 x 612 mm. ⚡
 ▶ Order Number BN 78012.

Standard Time System Type CAA BN 7804

The system BN 7804 comprises 3 systems BN 78011 which are inter-compared by means of a Phase Comparator Type XKC and a Rekord-er Type XKB. In addition, it contains the instruments of the system BN 78012 as well as a Rhythmic Signal Panel Type CAK and a Sidereal Time Converter Type CAS. The latter supplies sidereal-frequency signals for synchronous drive of astronomical instruments and a sidereal-time clock with a jumping second-hand. The system is comprised of a three-section cabinet rack, which is generally installed in the standard-time equipment room, and a single-section rack accommodating the 3 independent Frequency Standards of the Type XSA. 1 cabinet rack 1853 x 2012 x 612 mm and 1 cabinet rack 689 x 2012 x 612 mm. ⚡
 ▶ Order Number BN 7804.

R&S ELECTRONIC COUNTERS

Electronic Counter Type FER ♦ Maximum Rate 10,000 Counts per Second, Presentation in 8 Decades ♦

The Electronic Counter Type FER counts electric pulses of any positive-going waveform in the amplitude range of 1 to 30 v and therefore any type of event which can be represented by such pulses. For this purpose one needs suitable accessories (see below and page 25) as pickups, e.g., contacts, photocell arrangements, electromagnetic or piezoelectric transducers, etc. The first three decades of the counter use counter tubes, the remaining five decades use a mechanical register for indication. It is there-

fore possible to count a total of 100,000,000 individual events. An extremely high counting rate is attained for production, packaging, rpm measurements and radiation phenomena in atomic physics, to give but a few examples in the wide field of application. The Type FER can also be used for control purposes and delivers a 12-v pulse after every 10th, 100th, or 1000th event as desired. The Electronic Counter Type FER is housed in an R&S Standard Cabinet 35. ⚡ ▶ Order Number BN 4721.



Electronic Timing Unit for Type FER

Revolutions per minute or frequencies are measured with the Electronic Counter Type FER which counts for an exactly known time interval and is then shut off. The Electronic Timing Unit is designed for this purpose. Time intervals of 1 or 10 seconds can be selected. Moreover the set may be actuated from an external pulse or by hand. R&S Standard Cabinet 35. ⚡
 ▶ Order No. BN 47912.

Time-Interval Unit for Type FER

Feeds the Type FER with an exact frequency of 10 kc whose periods serve as time elements. The Type FER counts these time elements during the time to be measured. The elapsed time can be directly read. The unit also prepares the pulses defining the beginning and the end of the measured time interval in a form suited to the counter Type FER. R&S Standard Cabinet 35. ⚡
 ▶ Order No. BN 47914.



Electronic Counter Type FELZ ♦ Maximum Counting Rate 10 MC. Presentation in 8 Decades ♦

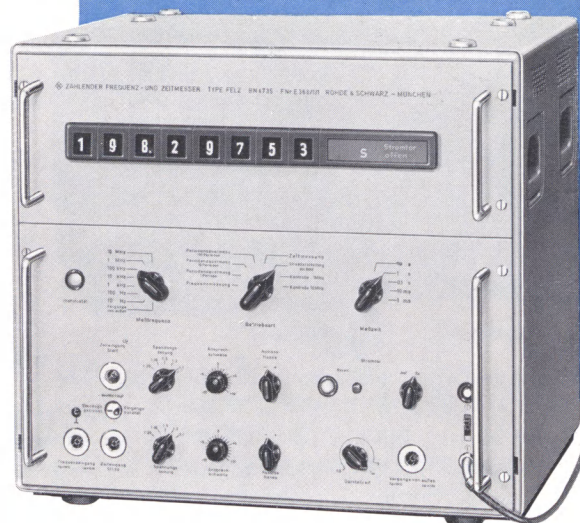
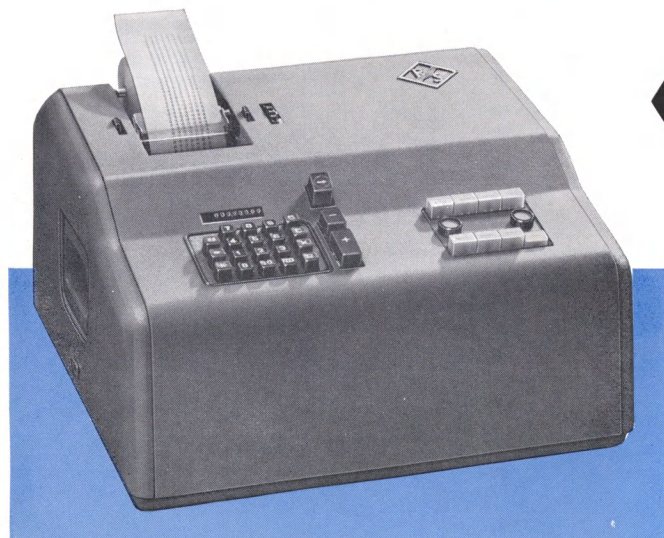
The Electronic Counter Type FELZ is an electronic counter equipped with special features and exhibiting outstanding performance. This instrument enables measurements to be performed on the most varied types of electrical, mechanical and physical phenomena which includes the measurement of high frequencies, frequency ratios, periods and time-intervals. The set is also usable as a frequency standard and time-marker generator. The distinguishing features include its extremely high counting rate, exceptional versatility, facility for selecting the polarity as well as the slope of the triggering pulses, high accuracy, easy-to-read in-line display and connection possibility for attaching a digital printer. The high counting rate, a factor which is very important in all types of measurements, is due to the resolving power for signals following one another in rapid succession. The Type FELZ allows events occurring at intervals as short as 0.1 μs to be dependably distinguished from each other and counted, a feature which is of considerable advantage in nuclear research and ballistic measurements. A maximum counting rate of 10 million events per second is obtainable for regularly recurring signals. Correspondingly, the display capacity is laid out for 8 decades. This makes it possible for the Type FELZ to measure directly a frequency up to 10 mc, no previous frequency conversion being necessary. A built-in frequency standard provides the 1-mc driving signal whose error is less than ± 2 parts in 10^7 . The effect of this error may be neglected in most measurements. If an external frequency standard of higher accuracy is available, the driving signal may be taken from this source. Time-interval and period measurements are possible for a range of time covering 0.1 μs to 2700 hours. Also, the Type FELZ is capable of indicating the ratio between two frequencies. Cabinet dimensions: 540 x 470 x 475 mm. ☞

► Order Number BN 4735.

Magnetic Pickup for Types FER and FELZ

In conjunction with the above described counters Types FER and FELZ, the Magnetic Pickup permits measuring the speed of turbines, gearwheels, etc. or determining the vibration frequency of diaphragms, strings, tuning forks, flat and spiral springs and similar mechanical processes involving fast-moving parts of ferro-magnetic material. The highest frequency measurable with the Magnetic Pickup is approximately 5 kc. Dimensions: $22\phi \times 45$ mm. Equipped with a cable of 5 m length.

► Order Number BN 47901.



Photoelectric Pickup for Types FER and FELZ

Pulses necessary for driving an electronic counter are produced with the aid of the Photoelectric Pickup with which a light beam is directed towards a reflecting mark on a moving test item, the resulting reflected beam then being detected with a photocell. Light source, photocell, optical system and amplifier are all incorporated in the instrument. The power is taken from the counters via a 5-conductor cable. Of course, the set will also operate using an external source of light. The distance between the optical system and the reflecting mark may be selected for either 10 mm or 150 mm. Revolutions per minute and vibration frequencies can be determined in a simple way without extracting any energy from the moving system.

► Order Number: Photoelectric Pickup with cable, BN 47902.

Printer Type DMA ♦ 9 Decimal Places ♦

For recording processes as a function of time, either recorders or printers may be used. Recorders mostly used in engineering practice provide a very illustrative survey in the form of curves; however, the accuracy is limited to approximately 1% and they are inconvenient whenever a numerical evaluation is required for subsequent calculations. In such cases, a digital record of the measured values, printed at equal intervals on a paper tape, is far more useful and gives more accurate results. The Printer Type DMA shown on the left side is a particularly useful instrument for technic, research and industry. It is capable of recording up to 9 digits per line and requires for each digit a preferable staircase-shaped driving voltage, which rises linearly with the numerical value. This voltage can be taken, for example, from 9 step switches or from potentiometers whose angles of rotation are to be recorded. Similar driving voltages can be derived from an electronic counter. In conjunction with our counter type frequency and time meter Type FELZ, it prints the counts or the result of frequency and time-interval measurements. Printing rates between 1 second and 6 minutes selectable. Connection of a recorder permitting continuous recording of any three consecutive digits of the printed value is provided. The Printer Type DMA can also add, subtract and multiply. Dimensions: 520 x 410 x 280 mm. ☞

► Order Number BN 47951.

R&S WAVE ANALYZERS



AF Wave Analyzer ♦30 CPS to 20 KC♦ Type FTA

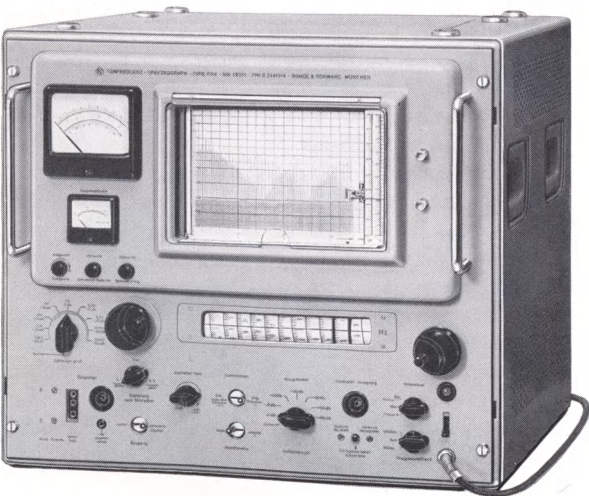
Separates a complex waveform in the frequency range 30 to 20,000 cps into its spectral components and then measures their amplitudes. The investigated waveform is mixed with a variable-oscillator frequency. The resulting i-f signal passes through a band-pass filter of 6 cps bandwidth, steep slopes and high stop-band attenuation. The i-f signal then passes from the bandpass filter to a panel meter. Linear or logarithmic voltage indication is selectable with an accuracy of $\pm 5\%$ or ± 1 db, respectively. Voltage range for the unbalanced input (100 k Ω shunted by 40 pf) is 10 μ v to 100 v or -100 to +40 db; for the balanced input (more than 8 k Ω), 10 μ v to 10 v or -100 to +20 db. The extremely narrow bandwidth of 6 cps is maintained throughout the frequency range, permitting, e.g., hum modulation sidebands at 20 kc to be measured with the full resolution of the instrument. For rough measurements a bandwidth of 200 cps can be selected. R&S Std. Cabinet 58. ♦

► Order Number BN 48302.

Synchronous Drive for FTA

This unit consists of a synchronous motor which via a reduction gear is coupled to the frequency-sweep knob of the Type FTA. An automatic wave analyzer can be obtained if the voltages measured with the Type FTA are plotted by the DC Recorder Type ZSG whose paper drive starts in synchronism with the frequency sweep of the Type FTA. ♦

► Order Number: for 220 v/50 cps and sweep speed of 50 cps/sec, BN 483021/50; 33 1/3 cps/sec, BN 483024/50. For 115 v/60 cps and sweep speed of 50 cps/sec, BN 483021/60; 33 1/3 cps/sec, BN 483024/60. 5 different gear boxes available.



Direct-Reading Distortion Meter ♦0.2 to 30 %♦ Type FTZ

Permits harmonic distortions at 40, 1000, 5000 and 15,000 cps to be measured rapidly and conveniently. The magnitude of the harmonic distortion can be read directly from a meter. The measurement range 0.2 to 30 % is covered in 4 sub-ranges. The accuracy of indication is $\pm 5\%$ of f.s.d. The permissible deviation of the test frequencies from their nominal values is $\pm 3\%$ at 40 cps and $\pm 5\%$ at the other frequencies. The impedance of the balanced input is greater than 10 k Ω , the permissible input voltage ranges from 50 mv to 4 v or -24 to +14 db. The impedance of the unbalanced input is 1 M Ω shunted by 40 pf, permissible input voltage 50 mv to 150 v or -24 to +46 db. R&S Std. Cabinet 55. ♦

► Order Number BN 4816.

Synchronous Oscillator ♦30 CPS to 20 KC♦ for FNA & FTA

In conjunction with the Analyzers Types FNA and FTA the Synchronous Oscillator is for frequency response measurements on filters, amplifiers, etc. Fed with the oscillator frequency of the analyzer it produces the exact audio frequency for which the analyzer is adjusted. The item to be measured is connected between the Synchronous Oscillator and the analyzer. The advantage of selective frequency response measurements is the suppression of interference and noise voltages and thus makes measurements over large attenuation ranges possible — all without additional tuning. Dimensions: R&S Standard Cabinet 55. ♦

► Order Number BN 483011.

Matching Transformer for Dynamic Microphones

This transformer is designed for matching dynamic microphones to the inputs of the Wave Analyzers Types FTA and FNA. For protection against interfering magnetic fields it is shielded with a high-permeability alloy (Mumetal) and enclosed in a cabinet. A 3-pole jack is provided for connection of the microphone. The length of the cable is not critical owing to the low matching impedance. ♦

► Order Number BN 483022.

Microphone Power Supply for Types FNA and FTA

This power supply provides for connection of our Condenser Microphone (BN 4503-40) and our Vibration Pickup Type EBVB (BN 452111) with Adapter Type EBVA (BN 452121) to the Wave Analyzers Types FTA and FNA. In addition to a stabilized power supply, it contains a two-stage amplifier providing up to 25 v at its unbalanced output. The distortion is less than 0.5 %. ♦

► Order Number BN 483023.

Audio-Frequency Spectrograph ♦30 CPS to 20 KC♦ Type FNA

The Audio-Frequency Spectrograph Type FNA separates a complex waveform in the range 30 to 20,000 cps into its spectrum components, i.e., it measures and records the amplitude of each frequency component. The frequency sweep can be operated by hand or automatically. The built-in recorder writes on ordinary paper 210 x 148 mm in size. 1:5 band spreading can be selected at any point of the overall range, the resolution thus being 4 kc over a paper width of 200 mm. The bandwidth of the set can be switched over from 10 cps (response down 80 db at 30 cps off-tune) to 200 cps. With automatic frequency sweep, the measurement in narrow-band operation takes 600 sec over 20 kc or 120 sec over 4 kc; in wide-band operation it takes 30 sec over 20 kc. Linear or logarithmic measurement can be selected. Accuracy $\pm 5\%$ or ± 1 db. For the unbalanced input, 100 k Ω , 40 pf shunt, the range is 1 μ v to 100 v or -120 to +40 db; for the balanced input, impedance greater than 8 k Ω , the range is 1 μ v to 10 v or -120 to +20 db. Dimensions: 540 x 475 x 490 mm. ♦

► Order Number BN 48301.

Spectrum of the frame and line blanking pulses (repetition frequencies 50 cps and 15,625 cps) plotted with Audio-Frequency Spectrograph Type FNA, actual size. Note that due to the print the spectrogram has lost in sharpness and detail.

R&S ACOUSTIC TEST SETS, VIBRATION METERS

Sound Level Meter Type EZGN $\uparrow 30$ CPS to 12.5 KC \downarrow

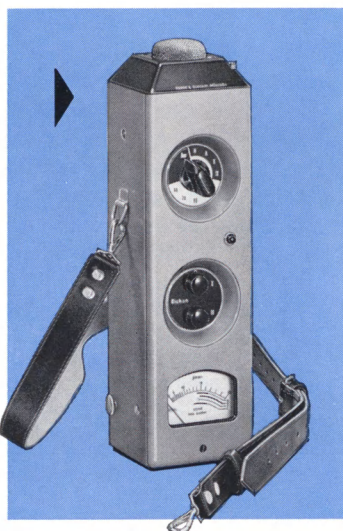
Offers direct-reading measurements of airborne-sound parameters, viz. sound pressure from less than 0.01 to 1000 μ bars, or from 20 to 134 db above threshold of hearing (2×10^{-4} μ bar), and the loudness level in German standard phons, i.e. weighted db closely corresponding to the ASA standards. Loudness can be measured from 1 to 320 sones in conjunction with the Sone Filter Type PBS in the frequency range 30 to $12,500$ cps. The accuracy of loudness level measurements conforms to German regulations for traffic-noise measurements, that is, ± 1 db at 1000 cps, ± 2 db at 60 cps, ± 4 db at 4000 cps. The accuracy for sound pressure measurements is ± 2 db between 50 and 5000 cps and ± 3 db above 5000 cps. Its range of application may be extended by connection to a second microphone, to a vibration pickup such as the Acceleration Pickup Type EBVB with Adapter Type EBVA, to band-pass filters for coarse analyses and to recorders and visual-display units. R&S Standard Cabinet 46. ∇

► Sound Level Meter Type EZGN: Order Number BN 4503. Second Microphone for Type EZGN: BN 4503-40. Acceleration Pickup Type EBVB: BN 452111. Adapter Type EBVA: BN 452121.

Standard Sound Level Meter Type EZL

A small instrument which permits objective measurement of loudness level in phons (db weighted according to German standard DIN; this weighting closely corresponds to curve B laid down by the American Standard Association). In addition, it measures the annoyance in strids (approximating ASA standard db_A). It is of advantage above all where portability and ease of operation are required. Although primarily developed for traffic-noise measurements, it is likewise suitable for many other loudness-level measurements, such as all types of measurements for noise control, testing of loudspeakers, and measurements of sound energy distribution. It reads loudness levels between 60 and 120 German standard phons, or db_B , in the frequency range 30 to $12,500$ cps. Built-in electrical calibration circuit. The accuracy complies with the narrow tolerances laid down by the German regulations for traffic-noise measurements. The tolerances of curve B of the ASA are met as well. The instrument is battery-powered, small, light in weight, easy to operate and particularly suitable for outdoor use. A leather carrying case is supplied. The dimensions without carrying case are $355 \times 100 \times 90$ mm.

► Order Number BN 4512.



Shown above is the Standard Sound Level Meter Type EZL. The acceleration meter Vibrotest EBL differs from it only in this, that the capacitor microphone mounted at the top of the instrument is replaced by a crystal pickup for vibration measurements. The pickup is connected to the set by means of a short length of cable and has the same appearance as that shown with the Vibration Meter Type EBV at the lower left.



Vibrotest (Acceleration Meter) Type EBL $\uparrow 30$ CPS to 12 KC \downarrow

The acceleration meter Vibrotest provides for electrical measurement of vibrations which contain frequencies between 30 and $12,000$ cps. Examples of application are: Investigation of the propagation of structure-borne sound, e.g. for localization of noise sources as a supplement to airborne-sound measurements or for non-destructive testing of materials and parts; examination of the dynamic loading of machine parts or vital components of aircraft and vehicles for the purpose of locating weak or excessively strained points in order to prevent fatigue failures and to obtain basic information for the design. This instrument has been developed in analogy to the Standard Sound Level Meter Type EZL and is likewise battery-powered. The acceleration range is 0.1 to 300 g (1 g = acceleration due to gravity = 9.81 m/sec²). In addition, velocities between 0.5 cm/sec and 10 m/sec can be measured after pressing a button. An electrical calibration circuit is incorporated in the instrument. A leather carrying case is supplied. Dimensions without carrying case $300 \times 85 \times 85$ mm.

► Type EBL: Order Number BN 4531. Adhesive wax to attach Acceleration Pickup: BN 45211-11.

Vibration Meter Type EBV $\uparrow 10$ CPS to 12 KC \downarrow

This instrument permits electrical measurement of vibrations in machines, vehicles, ships, aircraft, piping systems, buildings, etc. in so far as these vibrations contain frequencies between 10 and $12,000$ cps. It gives direct reading of accelerations from 0.3 cm/sec² to 3000 m/sec², velocities from 0.03 to 10 m/sec and displacements from 0.1 μ to 1 m. These values are important for judging material stress. The accuracy is ± 1 db at 1000 cps. A small electromechanical vibration box has been incorporated in the instrument to provide for calibration of the Acceleration Pickup. The cross-axis sensitivity of the Acceleration Pickup is down more than 20 db; hence the spatial components of vibrations can be determined separately. Like the Sound Level Meter Type EZGN, the Vibration Meter Type EBV can be extended to form a universal test assembly by connecting an oscilloscope, recorders such as Type ZSG, band filters such as Type PBO, heterodyne wave analyzers such as Type FNA or FTA, and tape recording instruments. These tape recorders permit low-frequency analyses by frequency transformation of the recordings stored on the tape. The dimensions of the Vibration Meter Type EBV are: R&S Standard Cabinet 46. ∇

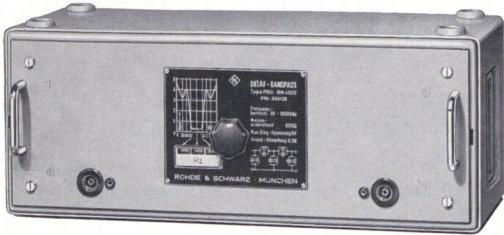
► Order Number BN 4521/3.



R&S ACOUSTIC TEST SETS AND VIBRATION METERS / continued

Octave Filter $\uparrow 31.5$ to $16,000$ CPS \downarrow Type PBO

Band-pass filters which permit separating the individual harmonics from the fundamental wave or certain frequency bands from a larger frequency spectrum are required for a great number of measurements on sound reproducing systems, such as audio-frequency amplifiers, sound-film equipment, and transmission systems between studios and modulation stages, for studying the acoustics of buildings and for many other purposes. The Type PBO is suitable in all these cases and, in addition, serves as a selective net-



work which in conjunction with the Sound Level Meter Type EZGN or the Vibration Meter Type EBV enables a coarse analysis of complex sounds or noises. The pass band of 1 octave can be shifted in 17 one-half octave steps over the range of 31.5 to 16,000 cps. Single-control operation with direct indication of pass-band and mid-band frequency. Diagram shows attenuation characteristic and stop-band attenuation. R&S Standard Cabinet 45.
► Order Number BN 4920.

Sone Filter Type PBS

This special filter translates the values measured in db (A) and db (B) or German standard phons into sone values which closely correspond to the subjective loudness perception. In conjunction with the Sound Level Meter Type EZGN it measures the sone values for loudness levels in the range 40 to 115 phons or 40 to 115 db (A) or db (B). The Sone Filter contains 1 low-pass, 1 high-pass and 4 band-pass filters which divide the a-f range into 6 switch-selected channels. The pass-band attenuation is 3 db, the stop-band attenuation more than 25 db, the characteristic impedance is 600 Ω . Frequency ranges of channels 1 to 6: 0—750 cps—1500 cps—2500 cps—3850 cps—6200 cps—infinite. Dimensions of the Type PBS: R&S Standard Cabinet 15.
► Order Number BN 4930.

Acceleration Calibrator Type EBVT $\uparrow 50$ CPS to 5000 CPS \downarrow

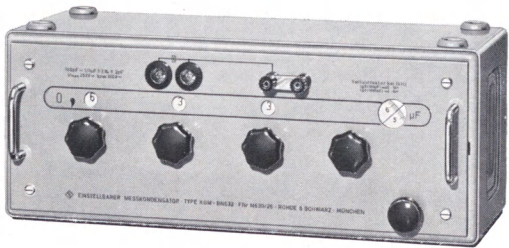
The Acceleration Calibrator Type EBVT provides for calibration of small acceleration pickups. Its calibrated acceleration is 5 metres per sec² and can be accurately set by means of a potentiometer at any frequency between 50 cps and 5000 cps. The calibration is made for a pickup weighing 22 grams. The Type EBVT is so adjusted that a pickup weight of 15 grams results in an increase of only 5% in the acceleration indication; a weight of 30 grams gives a 5% lower indication than 5 metres per sec². The cross-axis response is down more than 20 db in the range of 200 to 2000 cps. Dimensions of Type EBVT: R&S Standard Cabinet 15.
► Order Number BN 45217.



R&S CAPACITANCE METERS AND STANDARD CAPACITORS

Variable Test Capacitor $\uparrow 100$ pF to 1.11 μ F \downarrow Type KGM

Variable precision capacitors are indispensable for a great number of electrical measurements. The Type KGM features a dissipation factor as small as 5 parts in 10⁴ and covers the capacitance range of 100 pf to 1.11 μ f in 4 decade steps (100 to 1100 pf continuously, 10 \times 0.001 μ f, 10 \times 0.01 μ f, 10 \times 0.1 μ f). Owing to its high resonant frequency, which depending upon the capacitance value is about 0.35 to 11 mc, it can be used over a wide frequency range. A maximum of 250 v d-c or 100 v a-c may be applied to the input of the Type KGM. Double shielding assures immunity to stray fields. R&S Standard Cabinet 46.
► Order Number BN 532.



Limit Bridge Type KZS $\uparrow -25/12/6/2.5$ to 0 to $+2.5/6/12/25\%$ \downarrow

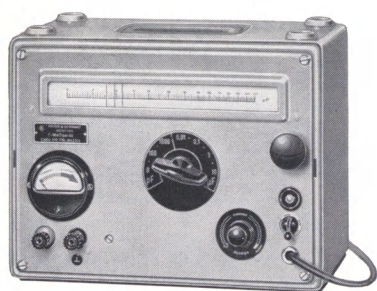
This instrument gives direct readings in percentage deviation from a suitable standard for resistors from 10 Ω to 1 M Ω , capacitors from 10 pf to 1 μ f and inductors from 100 μ h to 2 mh. The ranges of percentage deviation are $\pm 2.5\%$, $\pm 6\%$, $\pm 12\%$, $\pm 25\%$ and the measurement frequency is 17 kc. The test result can be read directly, thus ensuring speed and ease of operation particularly in production testing. An additional convenience is a connector for a foot switch. The range of application includes the adjustment of multi-gang capacitors for tracking and determination of temperature coefficients of capacitors and coils. The set is housed in an R&S Standard Cabinet 35.
► Order Number BN 5500.



Direct Capacitance Meter Type KKH

\uparrow Capacitance range 0.0003 to 30 pf \downarrow

This instrument permits measuring capacitances the two poles of which are more or less shielded from each other by an earthed electrode, for example the interelectrode capacitances of valves. The capacitance to earth of one pole is measured in the range of 0 to 60 pf simultaneously, that of the other can be measured after interchanging of the terminals. Further applications are the measurement of capacitances between contacts and the determination of the efficiency of shieldings for wires and sub-assemblies in instruments. Special sockets facilitating production testing can easily be provided. The test frequency is 500 kc. R&S Standard Cabinet 57.
► Order Number BN 5201.



Capacitance Meter Type KARU \uparrow Capacitance Range 0 to 10 μF \downarrow

Measures the capacitance of capacitors in the range 0 to 10 μF to an accuracy of $\pm 1\% \pm 0.5 \text{ pf}$. When one of the 6 measurement ranges is selected, the front panel window displays the associated scale, false measurements due to improper operation thus being prevented. The instrument operates on the resonance method, the test frequency being 175 kc to 1.5 kc dependent on the value of the capacitance. The dissipation factor of the capacitor does not affect the reading. Measuring the capacitance of long cables is possible because the test frequency is relatively low. The measured value can be read directly. Dimensions: R&S Standard Cabinet 35. R

► Order Number BN 510.

Automatic Test Bridge for Heavy-Current Capacitors KVZA

The Type KVZA is used for the checking of heavy-current capacitors. It consists of a self-balancing test bridge which, on two scales, gives a direct reading of the capacitance and dissipation factor. Capacitance range, in 15 overlapping sub-ranges, is 1 to 2000 μF for a test voltage of 50 to 1000 v and 0.1 to 200 μF for 0.5 to 10 kv. Capacitance accuracy $\pm 1\%$; dissipation-factor accuracy $\pm 2.5\% \pm 2 \cdot 10^{-4}$ in a range of 0 to $200 \cdot 10^{-4}$. Measurement at supply frequency; 50 cps only. Because of the wide voltage range and short balance time, about 4 sec, the Type KVZA serves also to test capacitors at overvoltage. The Automatic Test Bridge for Heavy-Current Capacitors is comprised of: 1 R&S Standard Cabinet 56, 1 special case 600x665x400 mm and 1 high-voltage capacitor. R

► Order Number BN 555.

Microfarad Meter \uparrow 0.01 to 5000 μF \downarrow Type KZT

Economic production requires a capacitance meter which offers direct reading without adjustment to resonance or bridge balancing. With the Microfarad Meter Type KZT the capacitance value can be directly read from a large panel meter. It is excellent for production testing or rapid determination of large capacitances, and particularly for electrolytic capacitors. The measurement range is wider than usually required in practice and permits all kinds of capacitors to be measured, beginning from the common paper capacitors up to electrolytic capacitors of extremely high capacitance. This range, 0.01 to 5000 μF , is covered in 11 steps. Accuracy $\pm 3\%$. Test voltage 7 v, maximum. Loading of the capacitor under test 1 mva, maximum. Measurement at supply frequency. R&S Standard Cabinet 35. R

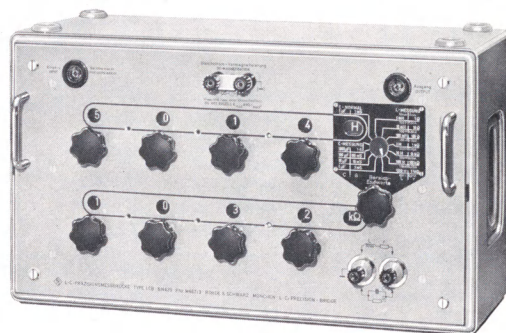
► Order Number BN 5400.

R&S INDUCTANCE METERS, STANDARD INDUCTANCES

L-C Precision Bridge Type LCB \uparrow 10 μH to 1000 H / 0.01 to 1000 μF \downarrow

Lossy inductors and capacitors as well as resistors with an inductive component are accurately measurable at frequencies between 50 cps and 20 kc. For inductances the measured values refer to the equivalent series circuit, the range covering 10 μH to 1000 h in series with 0.01 Ω to 1 M Ω . For capacitances the measured values refer to the equivalent parallel circuit, the range covering 0.01 to 1000 μF in shunt with 10 μmhos to 1 mho. The result appears in the form of two horizontal rows of figures, with automatic positioning of the decimal point. The test bridge can be fed from the RC Generator Type SRN; a suitable null detector is our Tunable Indicating Amplifier Type UBM. The Type LCB may be used also as a variable precision capacitor 100 pf to 1 μF and variable precision conductance 0.1 to 1000 μmhos . R&S Standard Cabinet 46.

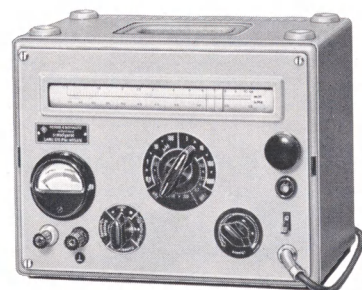
► Order Number BN 620.



Inductance Meter \uparrow 0.1 μH to 1 H \downarrow Type LARU

This instrument measures the inductance of coils in the very wide range 0.1 μH to 1 h with an accuracy of $\pm 1\% \pm 0.01 \mu\text{H}$. It operates on the resonance method. The frequency of measurement, 4.5 mc to 2.2 kc, is indicated on the scale. This permits determining the natural resonance of coils and parallel-resonant circuits. These two measurements in turn enable the distributed capacitance of the coil under test to be determined in a simple manner. Errors due to false manipulation are practically impossible. The linear scale on the cylinder type dial, time-tested in many R&S instruments, ensures ease of operation and reading accuracy. The inductance range is divided into 7 switched bands. The front panel window displays only the scale associated with the selected range, confusion of scales thus being impossible. Dimensions: R&S Standard Cabinet 35. R

► Order Number BN 610.



L-Decades Types LDN and LDH and Variometers Type LVN \uparrow 10 μH to 10 H \downarrow

Type LDN 10 x 1 mh: Order No. BN 6310

Type LDN 10 x 10 mh: Order No. BN 6311

Type LDN 10 x 100 mh: Order No. BN 6312

Type LDN 10 x 1 h: Order No. BN 6313

Type LDH 10 x 10 μH : Order No. BN 6321

Type LDH 11 x 100 μH : Order No. BN 6322

Type LDH 11 x 1 mh: Order No. BN 6323

Type LVN 0.1 to 1 mh: Order No. BN 6411

Type LVN 1 to 10 mh: Order No. BN 6412

R&S POWER SUPPLIES



Laboratory Power Supply Type NGU
♦ *D-c voltages* ♦, stabilized: (a) 100 to 300 v, calibrated scale, 100 ma, source impedance about 1 Ω , hum below 0.2 mv. (b) 0 to -100 v, calibrated scale, source impedance less than 25 k Ω shunted by 16 μ f, hum below 30 μ v. (c) 0 to -10 v, calibrated scale, source impedance less than 10 k Ω shunted by 50 μ f, hum below 10 μ v. ♦ *A-c voltages* ♦: (a) 6.3 v, 2 amps. (b) 4 v/6.3 v, 2 amps. (c) 15 v/18 v/21.5 v, 1 amp. R&S Standard Cabinet 35. ▶ Order Number BN 95140.

High-Voltage Tester Type UHP ♦50 to 2000 V DC♦
50/250/350/500/700/1000/1500/2000 v, max. 0.4 ma; resistance readings from 10 k Ω to 1200 M Ω . R&S Standard Cabinet 35. ▶ Order Number BN 1950.

Low-Voltage Power Supply NGN ♦0 to 1.5V DC, 0 to 30V DC♦
Stabilized low voltage source especially designed for transistors. Two independent, floating d-c voltages 0—30 v, max. 1 (2.5) amp and 0—1.5 v, max. 0.5 amp. This instrument is short-circuit proof. Dimensions: R&S Standard Cabinet 35. ▶ Order Number BN 95143.

Klystron Power Supply Type NGS
This power supply is specially designed for the klystrons in the SHF Signal Generators Types SMCB, SMCC, SMCD. Beam supply: 3 steps 500 v/14 ma, 1000 v/25 ma, 1250 v/25 ma; positive pole earthed. Reflector supply: 7 steps, 15, 100, 200, 300, 400, 500 v, 600 v, continuously variable between steps. Grid modulation by 1000-cps square-wave. R&S Standard Cabinet 55. ▶ Order Number BN 95147.

Battery and Vibrator Unit Type NBU ♦220 V AC♦
The voltage of the built-in 12-v battery is converted into 220 v/100 cps. Max. output is 35 va. Dimensions: 500 x 200 x 250 mm. ▶ Order Number BN 95151.

R&S TRANSFORMERS MATCHING PADS

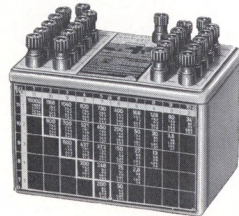
Broadband Baluns Type BSU ♦10 to 90/30 to 180/85 to 300 MC♦
These units serve as low-reflection transitions between unbalanced and balanced items, e.g. between balanced aerials and unbalanced receiver inputs. They are usable in both directions and therefore enable exact impedance measurements.



Designation	Type	Characteristic Impedance Ω unbal./bal.	Frequency Range mc	Power Rating w	Connectors unbal./bal.	Order Number
Broadband Balun	BSU	50/50	10-90	300	Dezifix B/2 terminals	BN 90610/50
Broadband Balun	BSU	60/60	10-90	300	Dezifix B/2 terminals	BN 90610/60
Broadband Balun	BSU	60/240*	10-90	1	Dezifix B/screened twin socket	BN 90610/240
Broadband Balun	BSU	60/60	10-90	300	Dezifix B/screened twin socket	BN 90610/D
Broadband Balun	BSU	50/50	30-180	300-120	Dezifix B/2 terminals	BN 90611/50
Broadband Balun	BSU	60/60	30-180	300-120	Dezifix B/2 terminals	BN 90611/60
Broadband Balun	BSU	60/240*	30-180	1	Dezifix B/screened twin socket	BN 90611/240
Broadband Balun	BSU	60/60	30-180	300-120	Dezifix B/screened twin socket	BN 90611/D
Broadband Balun	BSU	50/50	85-300	200-100	Dezifix B/2 terminals	BN 90612/50
Broadband Balun	BSU	60/60	85-300	200-100	Dezifix B/2 terminals	BN 90612/60
Broadband Balun	BSU	60/240*	85-300	1	Dezifix B/screened twin socket	BN 90612/240
Broadband Balun	BSU	60/60	85-300	200-100	Dezifix B/screened twin socket	BN 90612/D

* Unsuitable for impedance measurements; these types are for use in test setups where it is only important to convert from unbalanced to balanced systems.

Balanced General-Purpose Transformer TAN ♦30 to 20,000 CPS♦
The Balanced General-Purpose Transformer Type TAN is used for transmission of a-f voltages in the range from 30 to 20,000 cps. It features a flat frequency response. Matching values, d-c resistances, current and voltage ratings are indicated on a table attached to the housing. The power handling capacity of the transformer is 40 w at 50 cps. R&S Standard Cabinet 15.
▶ With centre tap 200/300/600/800/1600 Ω , without centre tap 2.6 to 1166 Ω (in 25 steps): Order No. BN 96900. With centre tap 0.6/2.5/5/10/20 k Ω , without centre tap 0.15 to 14.5 k Ω (in 25 steps): BN 96901.



Matching Pad Type DAF ♦DC to 1000 MC♦



For connecting measuring instruments, say, to receivers or transmission lines of different characteristic impedance. Frequency range 0 to 1000 mc, power handling capacity 0.5 w. VSWR 1.15 max. up to 1000 mc.
▶ 60 Ω to 75 Ω : Order Number BN 18083; 50 Ω to 75 Ω : BN 18084; 50 Ω to 60 Ω : BN 18085.

R&S COAXIAL COMPONENTS

Order Number	Connectors and Accessories	Suitable Types of Cable		Connection of the		Characteristic Impedance Ω	Power-handling Capacity at 100 mc kw ⁴	Insulation
		Max. centre conductor dia./min. inside dia. of outer conductor (measured in mm) or type of cable	Type of outer conductor	centre	outer			
FS 413/11	13-mm plug ¹	1.5/6.6	Braid	Soldering	Soldering	60	0.8	Ceramic
FS 432	Short-stroke connectors Dezifix B ²	1.5/6.6	Braid	Soldering	Soldering	60	0.25	Plexiglass
FS 435		2.3/10	Braid	Soldering	Soldering	60	1	Ceramic
FS 435/50		RG-8/U	Braid	Soldering	Soldering	50	1	Ceramic
FS 4350		2.3/10	Braid	Soldering	Clamping	60	1	Ceramic
FS 4350/50		RG-8/U	Braid	Soldering	Clamping	50	1	Ceramic
FS 4351		2.3/10	Solid	Soldering	Clamping	60	1	Ceramic
FS 4354		2.2/9.5	Double braid	Soldering	Clamping	60	1	Ceramic
FSW 4350	Short-stroke connectors Angle Dezifix B	2.3/10	Braid	Soldering	Clamping	60	1	Ceramic
FSW 4351		3.2/10	Solid	Soldering	Clamping	60	1	Ceramic
FSW 4352		1.5/6.6	Braid	Soldering	Clamping	60	1	Ceramic
FSW 4354		2.2/9.5	Double braid	Soldering	Clamping	60	1	Ceramic
FSW 4357		2.3/10	Double braid	Soldering	Clamping	60	1	Ceramic
FS 501	Short-stroke connectors Precision Dezifix B ³	2.3/10	Braid	Soldering	Clamping	60	0.25	Polystyrene
FS 501/50		Succo PTT 7x0.728	Braid	Soldering	Clamping	50	0.25	Polystyrene
FS 502		2.2/9.5	Double braid	Soldering	Clamping	60	0.25	Polystyrene
FZ 434	Short-circuit Dezifix B	Serves to short-circuit lines terminated in a short-stroke connector Dezifix B						
FZ 432	Wrench for Dezifix B	Serves to screw on the spring cap when assembling the short-stroke connector Dezifix B						

¹ Sockets (insulated: FD 413/11; earthed: FD 413/21) mating with this plug are available for panel mounting.

² The designation "short-stroke" connector indicates that only a very short axial movement is necessary for connecting cables with Dezifix connectors. This is of particular advantage for connecting cables with heavy outer conductors for handling high power since these cables are relatively rigid. A further advantage of the Dezifix system is that the connectors are identical, there being no male and female (sexless system). Only Size B Dezifix connection arrangements are shown. These are used on the measuring instruments. For larger Dezifix connectors used for higher power, please write for a separate list.

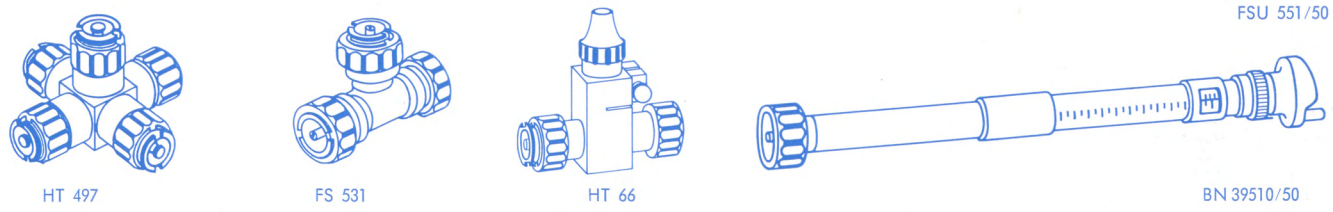
³ These Dezifix connectors feature negligible VSWR even in the range 600 to 3000 mc.

⁴ The specified power-handling capacity refers to the connector only, irrespective of the cable used.

Order Number	Adapters from Dezifix B to other Types of Connector	Characteristic Impedance Ω		Insulation
FSU 511/50	Adapter Precision Dezifix B to Plug N	50		Polystyrene
FSU 512/50	Adapter Precision Dezifix B to Jack N	50		Polystyrene
FSU 521	Adapter Precision Dezifix B to Plug 6/16	60		Polystyrene
FSU 522	Adapter Precision Dezifix B to Jack 6/16	60		Polystyrene
FSU 531/50	Adapter Precision Dezifix B to Plug 83-1 SP	50		Polystyrene
FSU 532/50	Adapter Precision Dezifix B to Jack 83-1 R	50		Polystyrene
FSU 541/50	Adapter Precision Dezifix B to 874 (50 Ω)	50		Polystyrene
FSU 551/50	Adapter Precision Dezifix B to Marconi Flange Connector	50		Polystyrene

Order Number	Branching Connectors	Characteristic Impedance Ω	Power-handling Capacity at 100 mc kw	Insulation
HT 497	Branching connector with 5 short-stroke connectors Dezifix B			Ceramic
FS 531	Branching connector with 3 short-stroke connectors Precision Dezifix B			Polystyrene
HT 66	VHF Probe Type Insertion Unit	60	1	Ceramic

Calibrated Adjustable Shorts and UHF Line Stretchers				
BN 39510/50 Calibrated Adjustable Short, 10 cm, 50 Ω	for 60 Ω BN 39510/60	for 75 Ω BN 39510/75	The Calibrated Adjustable Shorts have Precision Dezifix B connectors	
BN 39591/50 Calibrated Adjustable Short, 13 cm, 50 Ω	for 60 Ω BN 39591/60	for 75 Ω BN 39591/75		
BN 39550/50 Calibrated Adjustable Short, 50 cm, 50 Ω	for 60 Ω BN 39550/60	for 75 Ω BN 39550/75		
BN 3971/50 UHF Line Stretcher, 50 Ω, Δl = 35 cm, 470 to 2400 mc		BN 3971/60 UHF Line Stretcher, 60 Ω, Δl = 35 cm, 470 to 2400 mc		



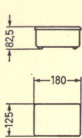
R&S WAVEGUIDE COMPONENTS

Frequency range in kilomegacycles per second		8.2 to 12.4	5.4 to 8.2	4.6 to 7.0	3.2 to 4.9
<p>The illustrations show waveguide components with cross-section WR 90. Components with other cross-sections have essentially similar shapes.</p>	<p>Designation and description of the waveguide components</p> <p>Note: All waveguide components are made of brass and are silver-plated; where necessary they are rhodium-plated in addition; the outer coating is enamel.</p>	<p>Cross-section</p> <p>WR 90</p>	<p>Cross-section</p> <p>WR 137</p>	<p>Cross-section</p> <p>WR 159</p>	<p>Cross-section</p> <p>WR 229</p>
		Order Number	Order Number	Order Number	Order Number
	<p>Waveguide, straight, 10 cm</p> <p>Waveguide, straight, 20 cm</p> <p>Waveguide, straight, 50 cm</p>	<p>HR 111/10/90</p> <p>HR 111/20/90</p> <p>HR 111/50/90</p>	<p>HR 111/10/137</p> <p>HR 111/20/137</p> <p>HR 111/50/137</p>	<p>HR 111/10/159</p> <p>HR 111/20/159</p> <p>HR 111/50/159</p>	<p>HR 111/10/229</p> <p>HR 111/20/229</p> <p>HR 111/50/229</p>
	<p>Circular Bend, 90°, E-plane</p>	HB 111/90	HB 111/137	HB 111/159	HB 111/229
	<p>Circular Bend, 90°, H-plane</p>	HB 121/90	HB 121/137	HB 121/159	HB 121/229
	<p>Series Tee For branching off of waveguides. Since the longitudinal currents in the wall are interrupted by the branch arm it appears to be connected in series.</p>	HT 111/90	HT 111/137	HT 111/159	HT 111/229
	<p>Shunt Tee With the branch arm at the narrow face, the main and branch lines appear to be connected in parallel.</p>	HT 121/90	HT 121/137	HT 121/159	HT 121/229
	<p>Hybrid Tee, matched (Magic Tee) Designed for bridge-circuit setups, e.g. for impedance comparison, for VSWR measurement, as frequency discriminator or as balanced mixer.</p>	HD 121/90	HD 121/137	HD 121/159	HD 121/229
	<p>Short-Circuit</p>	HK 11/90	HK 11/137	HK 11/159	HK 11/229
	<p>Adjustable Short Waveguide with fine adjustment of short-circuit position; serves as variable reactance, e.g. for matching.</p>	HM 131/90	HM 131/137	HM 131/159	HM 131/229
	<p>Calibrated Adjustable Short Design as above, but particularly accurate, precise setting by calibrated micrometer screw; serves for measurement of material constants and of four-terminal networks according to the node-shift method.</p>	BN 39611/90			
	<p>E-H Tuner Waveguide section with tunable series and parallel arms for tuning out residual VSWR in waveguide setups.</p>	HM 121/90	HM 121/137	HM 121/159	HM 121/229
	<p>Waveguide-to-Jack N Adapter, broadband</p>	HE 111/90	HE 111/137	HE 111/159	HE 111/229
	<p>Waveguide-to-Jack N Adapter, tunable Tuning permits minimizing the reflection of the adapter.</p>	HU 111/90	HU 111/137	HU 111/159	HU 111/229
	<p>Detector Mount, tunable For rectification of modulated and unmodulated microwave signals; for relative power and attenuation measurements.</p>	HM 111/90	HM 111/137	HM 111/159	HM 111/229
	<p>Detector Type Insertion Unit Serves for checking the operating level and for heterodyning.</p>	HM 141/90	HM 141/137	HM 141/159	HM 141/229
	<p>Waveguide Clamp For rapid and secure mounting of waveguide components in tests and measurements. Mounting rod screws into both sides.</p>	HZ 1/90	HZ 1/137	HZ 1/159	HZ 2/229
	<p>Stand For Waveguide Clamp.</p>	HZ 1	HZ 1	HZ 1	HZ 2

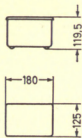
Any departure from the specifications listed in this catalogue, especially such desirable for reasons of improved design, will be permissible.

R&S STANDARD CABINETS

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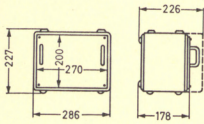


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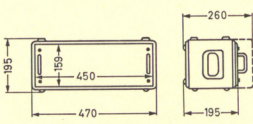


Excepting custom-made models, our measuring instruments are housed in strictly uniform standard steel cabinets the most important of which are shown here as drawings to scale. The rugged cabinets feature rounded edges, a removable front cover and hinged carrying handles; the finish is light-grey enamel (RAL 7001). After removal of the frontpanel screws the chassis can be withdrawn from the cabinet by the handles. Generally, the chassis is readily usable for rack-mounting. Dimensions in millimetres!

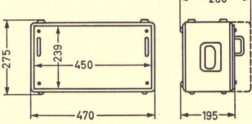
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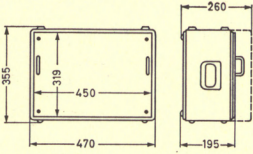
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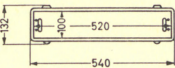
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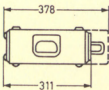
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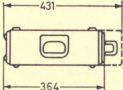
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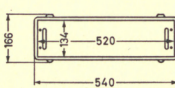
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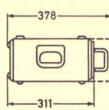
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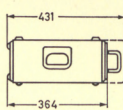
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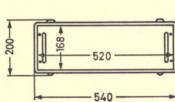
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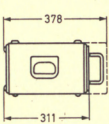
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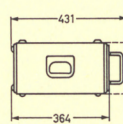
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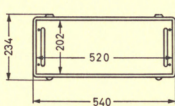
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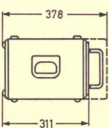
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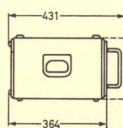
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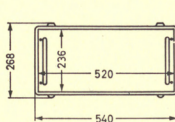
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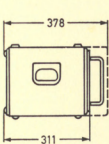
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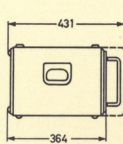
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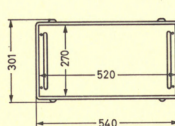
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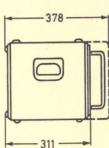
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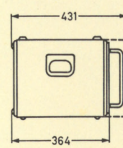
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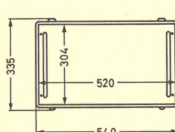
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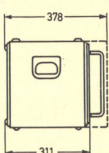
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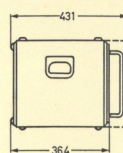
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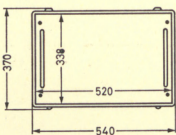
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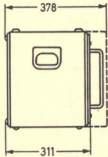
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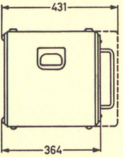
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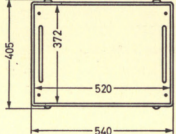
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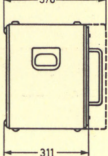
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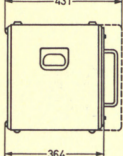
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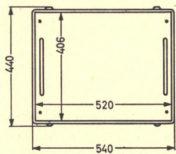
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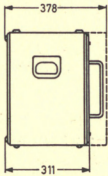
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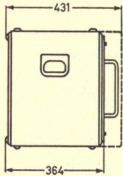
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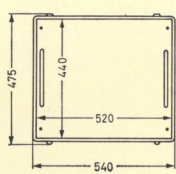
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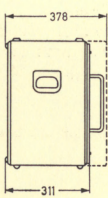
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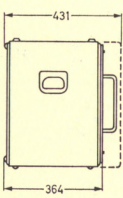
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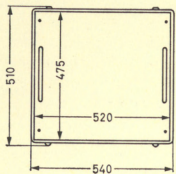
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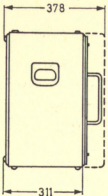
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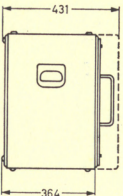
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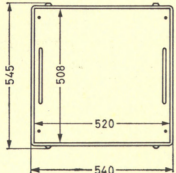
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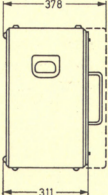
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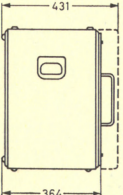
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No. 515



No. 5151



R&S Standard cabinets are not sold separately!

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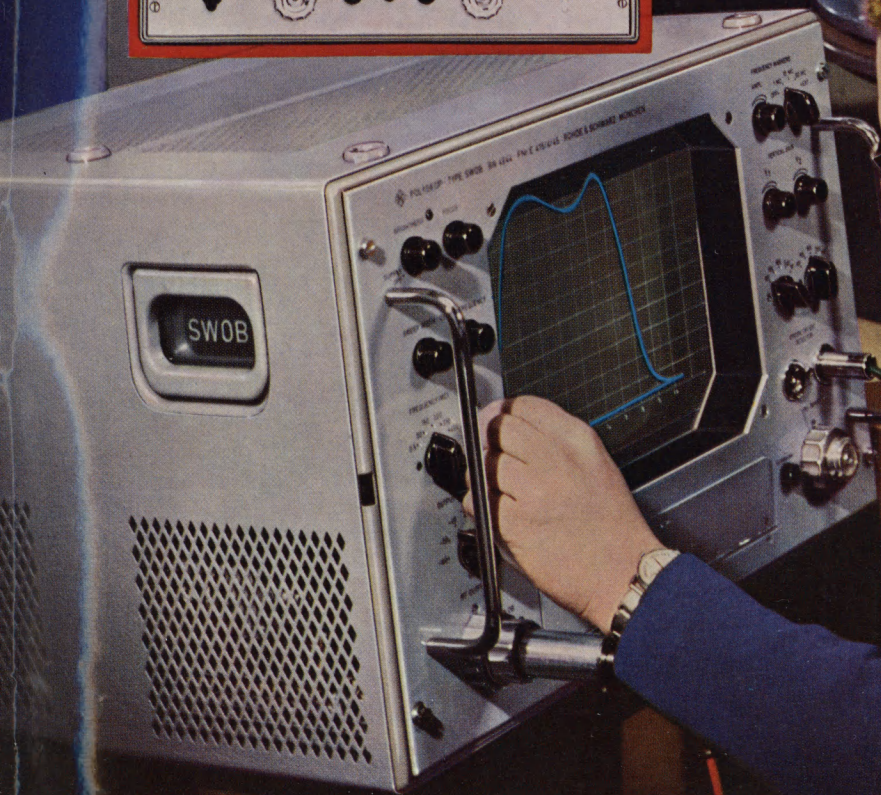
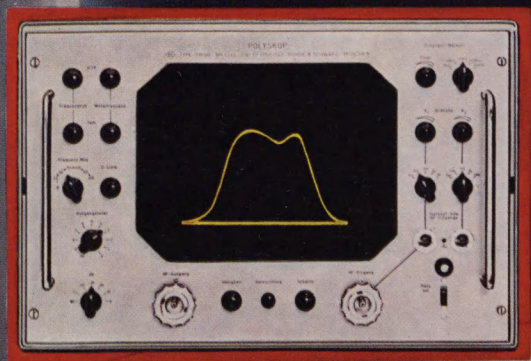
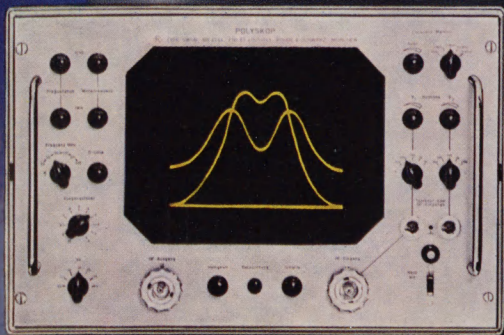
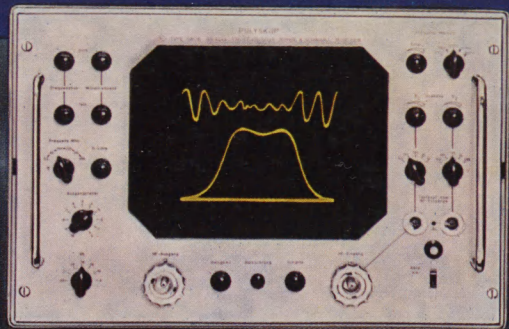
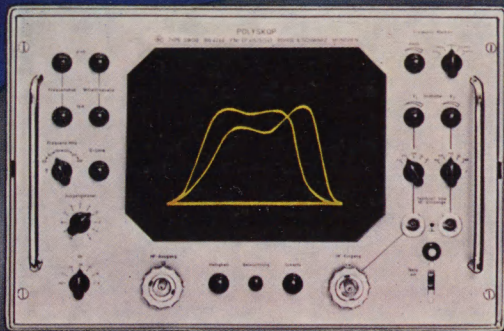
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TEST SETUP FOR DISPLAYING THE FREQUENCY-DEPENDENT CHARACTERISTICS OF A TRANS-MISSION SYSTEM. Adjustment of i-f filters in a television receiver using a Polyskop Type SWOB to observe the resulting band-pass characteristics.



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